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MANAGEMENT SECTION

AMES, IOWA

CONTENTS

Farm Organization and Management Studies in Warren County, Iowa

By C. W. Crickman[1]

The successful operation of a farm business is an individual, economic problem. The progress or financial success of any particular farmer is largely determined by his ability to manage and his willingness to work industriously. A farmer must perform not only the physical labor of his business, but in addition he must do the managing. Tho honest labor is essential for success, labor without efficient direction and management may be fruitless.

The fact that many farmers accumulate rapidly and become prosperous, while near neighbors, who apparently work just as hard, fail to get ahead indicates the need for the collection of data which will furnish the basis for an intelligent study of the conditions underlying and surrounding business successes on the farm.

It was to find the best methods of farm management and organization that the studies reported in this bulletin were made. The farm organization and management survey has become a common method of determining profits of individual farmers and of acquiring data which can be used for an intelligent study of the farm business.

This study is based upon a series of organization and management surveys[2] of farms in Warren county, Iowa, and on census reports of the county from 1850 to 1920, inclusive. The first survey on 832 farms was taken in the summer of 1916 for the farm year beginning March 1, 1915. Three years later, during the summer of 1919, a similar survey was made on 177 farms for the year beginning March 1, 1918. A third survey was taken during the summer of 1922 on 231 farms for the year beginning March 1, 1921. Altho smaller in extent, the surveys of 1918 and 1921 covered practically the same area surveyed in

[1]Acknowledgement is due C. L. Holmes, chief of the Agricultural Economics section, for the portion of this bulletin summarizing the farm organization and production problems brought out by the study and also for general supervision of the data and the presentation of the results. Acknowledgement is also due the following men who collected the data; in 1916, Jay Whitson, Louis Sawyer, R. J. Leth, W. T. Maakestad, George X. Reed, M. B. Poston, and O. G. Lloyd of the Iowa Agricultural Experiment Station; in 1919, Earl D. Strait, J. C. Rundles, C. F. Sarle, F. H. Shelleday, R. D. Jennings, C. C. Taylor of the United States Department of Agriculture, and O .G. Lloyd of the Iowa Agricultural Experiment Station; in 1922, C. C. Taylor, W. H. Youngman, E. L. Cady, all of the Iowa Agricultural Experiment Station. (The author assisted in the field work in 1922.) H. B. Munger, formerly Chief of the Farm Management Section, had general supervision of the 1916 and 1919 surveys. Thanks are also extended to the many farmers in the area whose courtesy in giving records of their farm business made this study possible.

[2]The survey in 1919 was made in cooperation with the Office of Farm Management, United States Department of Agriculture.

1915, and many of the same farms were studied each year. The facts brought out, tho strictly applicable only to the farms surveyed, should offer valuable suggestions to all farmers following the same general type of farming.

OBJECT OF STUDY

The important objectives in conducting these investigations were as follows:

(1) To ascertain the type of farming followed and the profits realized in an agricultural community in Iowa which is representative of the better farming section of the Southern Iowa loess area.

(2) To note changes that have taken place in the type of farming during the six year period with a view of determining the extent to which farmers have adjusted their farm business with changing economic conditions, and so far as practicable, the effect of the adjustments upon the farm profits.

(3) To determine the significant factors that make for success or failure in the management, and to measure if possible the relative importance of these factors when applied to individual farms.

(4) To determine the farm practices that enable some farmers to excel others in single enterprises or in the entire farm organization.

(5) To obtain data as a basis for definite and concrete suggestions to farmers who feel that their profits might be increased thru a modification of their present system of farm organization and management.

DESCRIPTION OF THE AREA

LOCATION AND TRANSPORTATION FACILITIES

Warren county is located in south central Iowa. In fig. 1 the area surveyed, consisting of approximately four townships centering at Indianola, the county seat, is shown by the heavily shaded portion. The larger and more lightly shaded area includes that part of the state which has a type of farming more or less similar to the area studied. The railroads and primary highways which cross the county have been sketched in the map to indicate the general direction of traffic movements.

The Kansas City division of the Chicago, Rock Island and Pacific, which crosses the northwest corner of the county, is the main artery of commerce for the area. A number of farms, however, have to depend upon the spur of the Chicago, Burlington and Quincy, which comes into Indianola from the south, for an outlet to the central markets. The railroad service can hardly be termed excellent because of the inconvenience of the delay of

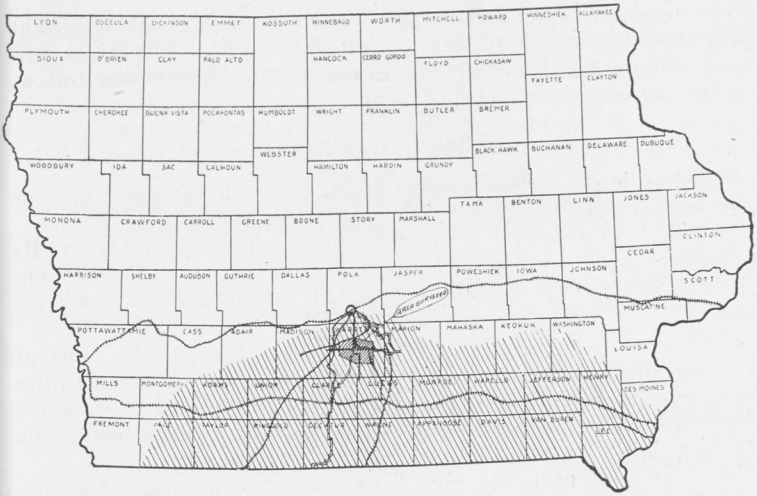

Fig. 1. Area in which data were obtained and the region having a similar type of agriculture.

transfers, but there are few farms at a distance greater than 10 miles from a shipping station.

There are no gravel or hard surfaced roads in the county, but the primary routes are well graded and can be travelled with loads at practically all times of the year. Other roads are fairly well graded and ordinarily in fair condition.

Indianola, with 3,600 population, is the chief local market and trading center. There are a number of smaller trading points and shipping stations, well distributed thruout the county. Des Moines is within short driving distance. A few farms send market milk into Des Moines, but otherwise Des Moines probably does not affect the local agriculture to any appreciable extent.

TOPOGRAPHY AND SOIL

Most of the territory east of Indianola and just to the west of town is gently rolling to level in topography. To the southwest and farther northwest, however, the topographic features are more extreme. The tributaries of the streams have cut back so far into the upland that there is very little of the original upland between them which has not been affected by washing. There are large areas of unimproved pasture land in some parts of the county. Practically every farm has the problem of adjusting the type of farming to the use of a fair sized area of untillable pasture.

Warren county is within the southern Iowa loess area and hence the soils are mainly loessial in origin. There are, how-

ever, areas of drift soil derived from the glacial material of the Kansas drift. The drift soils are to be found where the covering of loess has been removed by erosion. This loessial soil was originally quite productive, but the maintenance of fertility has already become a serious problem on some farms and threatens to become such on many more farms in the future. The inroads of erosion, together with the narrow rotations practiced on the small crop areas of the different farms in order that enough feed grains may be available to supplement the pasture and hay areas, are gradually leaving behind noticeable effects. Bluegrass is the principal pasture grass and comes in to crowd out clover or timothy in pastures which are left standing a few years.

CLIMATE

The average annual growing season is 167 days. The average date of the last killing frost in the spring is April 24, and the first in the autumn is October 8, according to the records of the United States Weather Bureau Station at Indianola. Observations at the same station show the average annual precipitation to be 32.97 inches. The greatest amount of rainfall occurs during May and June, being on the average 4.49 and 4.46 inches, respectively. The length of growing season from the last killing frost in spring to first killing frost in fall and the distribution of precipitation by months are shown in fig. 2.

TYPE OF FARMING

The type of farming in the area surveyed is mainly a combination of grain and livestock farming. Dairying is carried on to a moderate extent on some farms with the raising of other stock. Practically all the grains produced, with the exception of the landlord's share on farms operated under a grain share lease, are fed on the farms where grown. In general, the income is derived from the sale of livestock, wheat, dairy products and the surplus of corn or other general farm products. In the northern part of the county nearer Des Moines dairying is becoming quite common.

TENURE

The percentage of farmers in Warren county who rent the farms they operate is somewhat below the state average of 42 percent. The 1920 census shows that 65 percent of Warren county farmers own their farms. Of the 35 percent who rent, 10.7 percent pay cash, 14.4 percent give a share of the crop, and 7.9 percent rent part of their farms for cash and the remainder on the crop share basis.

The percentage of farms surveyed which were operated by their owners was slightly lower than the census figure of 65 per-

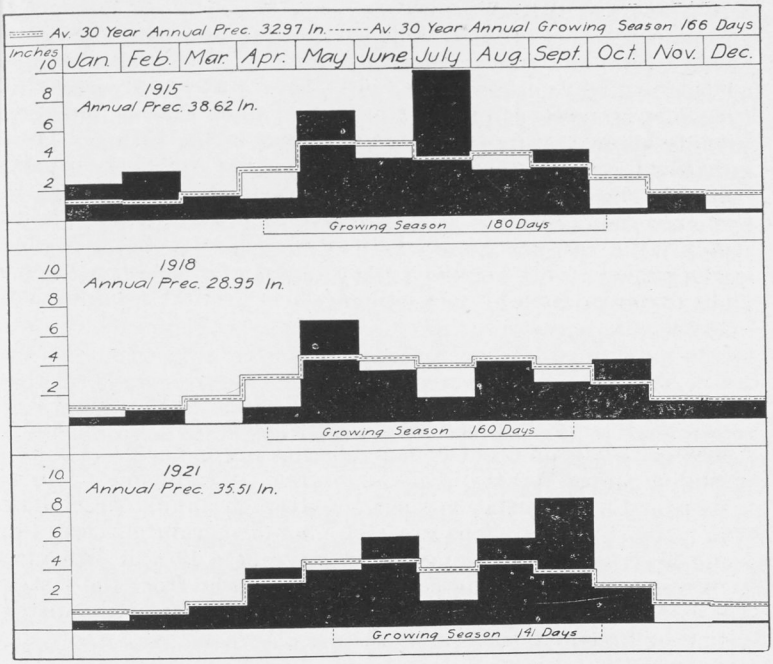

Fig. 2. Monthly precipitation, Indianola, Iowa, 1915, 1918 and 1921. The chart is based on climatological data, Iowa Section, United States Weather Bureau, United States Department of Agriculture. The chart shows aslo total yearly precipitation and the normal seasonal distribution of rainfall as represented by the average of the last 30 years. It shows also the length of growing season.

cent. Also, a comparison of the percentage of cash rented farms included in the survey with the county average discloses an appreciable variation. Of the 231 farms surveyed, only 13 were operating under a cash lease, which would be about 5.6 percent as compared with 10.7 for the county as a whole. The difference is most likely to be accounted for in the location of the surveyed area within the county, and the tendency of the census bureau to class as cash-rented those farms having a large area of pasture so rented even tho crop land is rented on shares.

METHOD OF DETERMINING PROFITS

In measuring the financial success of a farm business it is necessary to keep in mind that income above farm expense consists of the returns from two distinct sources: (1) Interest on the investment, and (2) a return for the combined services of the farmer's own labor and supervision. Unpaid labor of other members of the family may also be included in the latter. The farm-

er's present or future wealth may be limited by his inclination and ability to organize his business for the complete utilization of his capital and labor resources, but ordinarily success in management will be measured by the ability to secure a greater return for resources employed than might have been obtained by turning those resources over to the supervision of some other individual at the market rate. The degree of success for a short period of operation, then, can best be measured in terms of wages to management earned. In this connection it seems permissible to apply the term profits to wages of management and in referring to profits in the course of the discussion it is always understood to mean wages of management.

It becomes necessary, therefore, to make allowances to investments and unpaid labor in order to arrive at profits. No attempt has been made in summarizing the data to include changes in value of real estate. The returns to investment in farm real estate have in the past no doubt been combined earnings from operation together with an increase in the value of the land itself. However, in this survey it seems advisable, in order to keep income from farm operation independent of income from land ownership, to base the allowance to real estate upon the net cash rental value rather than upon the estimated market rate of interest for equally desirable investments. Net cash rental value as used is determined by deducting the land charges which would ordinarily be paid by the landlord from the gross cash rent received. An estimated cash rental value was used in summarizing owner and share rented farms. Interest on investments other than real estate, that is in working capital, was deducted at a current rate for operating loans. The farmer gave an estimate of the value of his own labor together with that of other members of his family. This figure was used in making the deduction for unpaid labor.

AGRICULTURAL SITUATION DURING THE PERIOD

Agriculture is at the mercy, not only of the markets, but also of the weather and the seasons. It is possible for some industries to prosper regardless of the weather if only the markets are right. But agriculture must face both uncertainties. The history of the farmer's situation is an alternation of good times and bad, of good harvests and bad, of times when profits are relatively liberal and times when they are pitiably small and perhaps even a minus quantity. Since the general agricultural situation is so important in determining the prosperity of groups of farmers, a comparative study of the profits of a region over an extended period should not be planned without some background of the prevailing conditions, both climatic and economic.

Furthermore, changes in economic conditions frequently cause wide variation in the relative costs of the various productive factors and the prices received for different farm products. Hence the most advantageous adjustment of farm enterprises and the practices employed in each enterprise cannot be made for all time; they should be constantly altered to meet changing prices if best results are to be obtained. Further, the farmer is concerned not only with what has been most profitable in the past, but with what is most profitable now and likely to be in the future. To be comprehensive, therefore, the analysis should determine wherein relations have been affected by abnormal conditions and in addition to pointing to actual relations should suggest some idea of normal relations as a basis for future planning.

CLIMATIC VARIATIONS

Some idea of the effect of rainfall on crop yields can be obtained by comparing fig. 2 with fig. 3, which shows the percentage fluctuations in the yield of corn, oats, wheat and hay in Warren county from 1900 to 1922, inclusive. The straight line in the charts showing yields represents the trends of yields over the period and the fluctuations are expressed in percent of the trend.

The average precipitation during the year 1915 was 38.62 inches, or 5.65 inches more than normal. The annual growing season was 180 days or 14 days above normal. But these differences alone do not give a fair idea of the conditions that prevailed. The striking climatic features of the year were the remarkably cool summer, the frequency of showers during the crop season, and the excessive cloudiness. Showers were not only frequent, but many were heavy, which delayed corn planting and replanting, interfered with haying and ruined much of the hay and grain after it had been cut. The cool, wet and cloudy weather prevented the normal development of corn, and as a result much of the corn was not fully matured at the time of the first killing frost. The yield of all the principal crops, with the exception of oats, was normal, but the quality was far below normal.

In contrast to the cool, wet season of 1915, the summer of 1918 was warm and dry. The month of July and the fore part of August were abnormally dry and hot, resulting in serious damage to the corn crop. Oats and hay suffered heavily also. Winter wheat, however, came thru with a normal crop and spring wheat yielded somewhat above normal. The total precepitation for the year averaged 4.02 inches below normal. The season advanced rapidly in the spring and conditions were favorable for all crops till the heat and drought came on. Corn was of excellent qual-

ity. Generally, favorable weather in all seasons largely offsets labor shortage.

Spring advanced too rapidly in 1921. Oats were seriously damaged by freezes in March and April. The last killing frost on May 12 cut the growing season to 141 days, or 25 days below normal. Moreover, the heat was so excessive during June and July that oats were badly injured and produced a very light crop. Winter wheat did fairly well. Corn, altho injured by drought in July, gave an excellent yield.

SELLING PRICES

The three years for which farm earnings are presented here represent periods of extremes in the cycle of price levels induced by economic influences growing out of the World War. The year 1915, while not wholly unaffected because the price of wheat averaged about 50 percent above a pre-war value, represents a comparatively normal pre-war year from the standpoint of prices of farm products. The Bureau of Labor's price index for farm products stood at 104 for the year. Altho the wholesale prices of farm products were not so high in 1918 as in the two years following, nevertheless farm earnings probably were most favorable, because farm costs, which had lagged behind during the period of rising prices up to 1918, were overtaking prices of the produce of the farm and tended to decrease profits during 1919 and 1920. Following in the wake of war prosperity, 1921 represents the period of both deflated prices and a time when the farmer found it difficult to adjust costs to the new order of conditions, with the resulting disastrous effects upon farm earnings.

To determine the variations in the relations between the prices and value per acre of the principal farm products from the usual relations which exist between them, the charts in fig. 3 were constructed. For the year 1921 the relative positions of crop and livestock products were below normal. The value of corn per acre in Warren county was 47.1 percent below normal, oats 63.7 percent, wheat 47.7 percent and hay 32.2 percent. The Chicago price of hogs was 22.5 percent below normal, steers at Chicago 21.2 percent and butter 2 percent at New York.

From the standpoint of relative positions, as measured by these deviations from the general course of values, corn was probably in the most favorable position during 1921. The value of wheat per acre stood in about the same relative position as corn and the cost of producing an acre of wheat is less than the cost of producing an acre of corn; but the corn has additional utility as a feed for livestock, which gives the crop some advantage from the standpoint of enterprise selection. Livestock and livestock products, particularly dairy products, occupied better positions relative to their usual values than did crops.

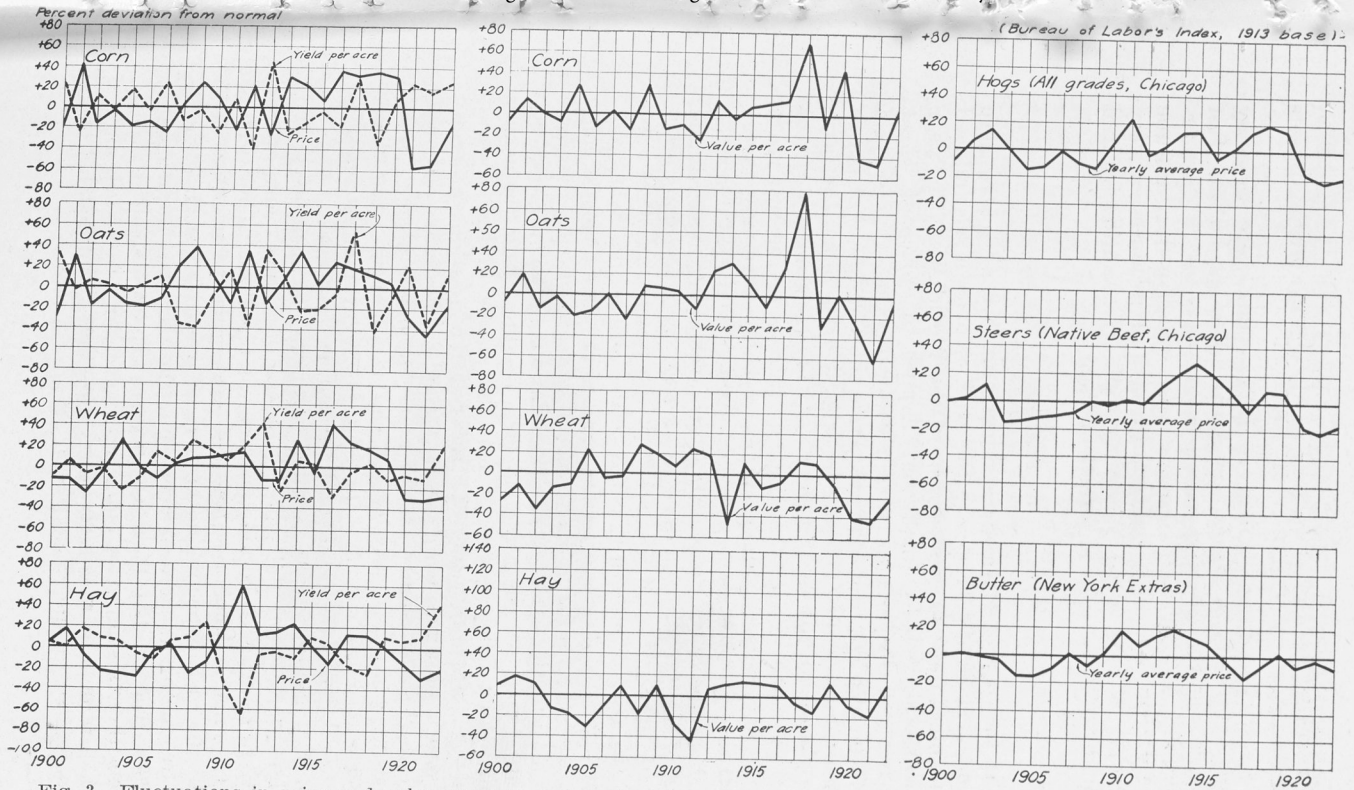

Fig. 3. Fluctuations in price and value per acre of principal farm products, Warren county, Iowa, 1099-1922. The original prices of corn, oats, wheat and hay are yearly average farm prices as reported for Iowa in the Yearbooks of the U. S. Department of Agriculture. Butter prices are yearly average wholesale prices of 92-score butter at New York as reported by the U. S. Yearbook. Yields are as reported in the Iowa Yearbook of Agriculture. Cattle and hog prices are taken from the Chicago Daily Drovers Journal Yearbook. The curves represent deviations from normal in percent of normal (Secular Trend). The original prices were corrected for price level changes by using the Bureau of Labor Statistics' Index, base 1913.

TYPE OF FARMING AND FINANCIAL ORGANIZATION

UTILIZATION OF LAND

Fig. 4 shows the proportions of the farm land that were used for crops and for the various classes of pasture, and that which lay idle either as woodland or as waste land, for all farms for the years 1915, 1918 and 1921. In 1919, 57 percent of the total land area was used for growing crops and 38 percent was in pasture, while the remaining 5 percent was occupied by farmsteads and roads, etc. In 1918, 54 percent of the farm area was in crops and 41 percent in pasture. In 1921, 59 percent was in crops and 37 percent in pasture. Much of the pasture land in this region was described as permanent pasture. Slightly over half of the pasture area could be put in crops if desired, but in most cases even the tillable pasture area was located on the roughest section of the farm. The decrease in farm area used for crops in 1918 was probably due to the farm labor shortage caused by the young men leaving the farms for the training camps. A similar decrease in percentage of land in crops in 1918 was noted in Tama county studies[3].

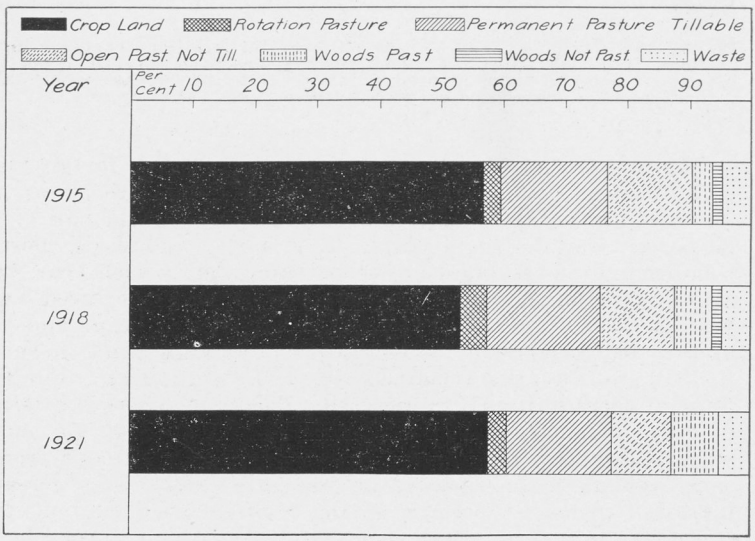

Fig. 4. Utilization of land on surveyed farms in Warren county, Iowa, 1915, 1918, and 1921. Note the variations in crop land, rotation pasture, permanent pasture tillable, in the three years. The charts are based on averages from 832 farms in 1915, 177 in 1918, and 231 in 1921.

[3]Munger, H. B., Iowa Farm Management Surveys in Blackhawk, Grundy and Tama Counties. Iowa Agricultural Experiment Station Bulletin 198, p. 358.

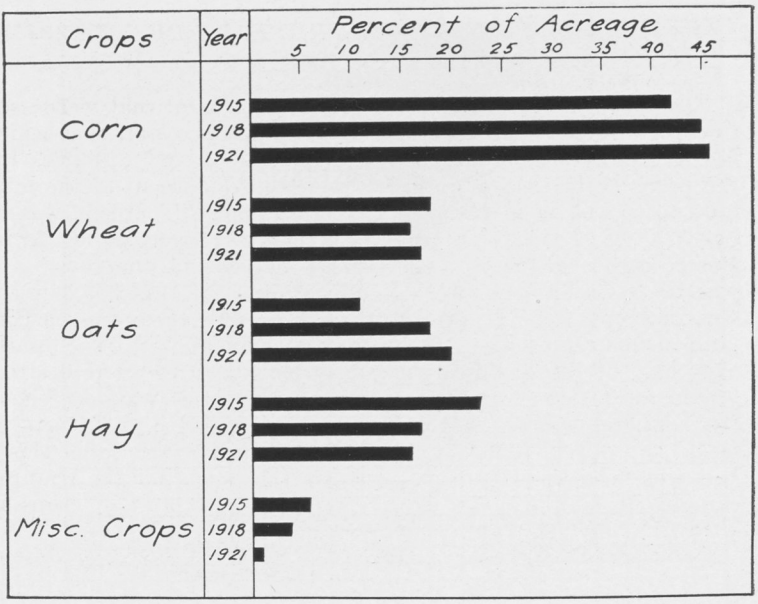

Fig. 5. Distribution of crop acreage on surveyed farms in Warren county, Iowa, 1915, 1918, and 1921. This chart is based on averages from the same number of farms as used in Fig. 4. Note the increase in corn and oats and the corresponding decrease in hay and other crops.

The proportions of the crop land used each year for growing corn, wheat, oats, hay and miscellaneous crops are shown in fig. 5. Corn occupied approximately 45 percent and hay 17 to 23 percent for the three years. Rye, barley and seeds, mostly timothy and clover, were grown on a few farms each year, but are only of minor importance. Corn and oats increased each year in acreage, particularly oats, while wheat acreage and the area in hay decreased. Wheat reached its high point in value in 1916 and the price remained practically stationary, while the price of corn continued to increase. The value of corn in terms of other commodities was highest in 1918. The call for more wheat to supply the American army overseas was not issued early enough to be effective on the 1918 crop. Oats acreage increased primarily because of the relative price relations between hay and oats. Both prices and yields were favorable to oats, particularly in 1917. Farmers are more reluctant to seed grass when grain prices are high.

The historical relationship as shown by the percentage of the crop area represented by corn, wheat, oats and tame hay is shown graphically in fig. 6.

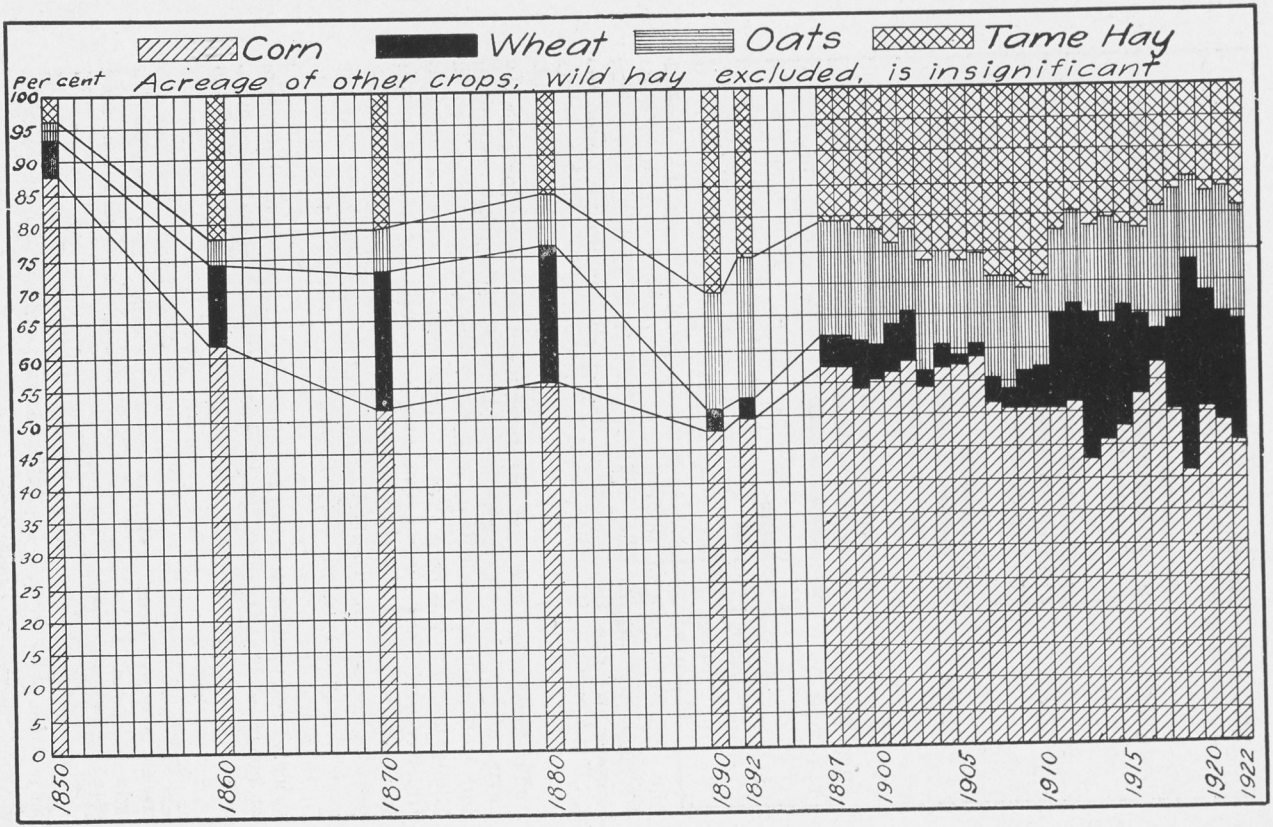

Fig. 6. Changes in choice of crops in Warren county, Iowa, 1850-1922. This chart is based on acreage figures for the county as a whole from the federal census and such state statistics as are available.

TABLE I—DISTRIBUTION OF AVERAGE NUMBER OF ANIMAL UNITS ON FARMS, WARREN COUNTY, IOWA.
832 farms 1915; 177 farms 1918, and 231 farms 1921.

Kind of live-stock	1915		1918		1921	
	No. of animal units	Percent of total	No. of animal units	Percent of total	No. of animal units	Percent of total
Cattle	18.4	50.1	17.4	54.3	17.2	55.0
Hogs	13.5	36.7	10.8	33.8	11.3	36.0
Colts	2.2	6.0	1.4	4.4	0.4	1.3
Sheep	1.0	2.8	0.5	1.6	0.6	1.9
Poultry	1.6	4.4	1.9	5.9	1.8	5.8
Total	36.7	100.0	32.0	100.0	31.3	100.0

DISTRIBUTION OF LIVESTOCK

The amount of livestock as measured by the average number of animal units[4] did not vary to any great extent during the period of six years covered by these studies. Table I shows that the average number of animal units per farm, of all classes of livestock, decreased from 36.7 units in 1915 to 32 in 1918, but that the number remained practically constant from 1918 to 1921. The most noticeable variation during the period was in the number of hogs on these farms. The number of animal units of hogs in 1915 was 13.5; in 1918, 10.8, and 11.3 in 1921. The number of chickens showed an increase. A change of considerable significance was the decrease in number of colts. Horses were too low on the market to raise colts for sale, yet it is doubtful if the work stock were being replaced by colts raised on the farm. The farmers were selling more dairy products in 1921, but were doing so without increasing the number of cattle on the farm. If more cows were kept, more calves were vealed, and the milk or cream, which formerly was used for raising calves to be marketed as stockers or feeders, was sold.

CROP YIELDS

The yield of all the principal crops, with the exception of oats, was normal in 1915, but the quality of corn and hay was poor, due to a cool, wet summer. Corn suffered heavily in yield from

[4]In order to compare numbers of livestock on different farms, it is necessary to have a standard of comparison. The different kinds of livestock are reduced to a common denominator and expressed in "Animal Units." One animal unit represents a mature horse, cow, steer, two colts, two head of growing cattle, three hogs, seven sheep, or 100 chickens kept for a year. In 1921 the method of figuring hogs, sheep and chickens was changed to allow one animal unit to represent 10 mature sheep, 20 lambs, 100 hens or roosters and 200 spring chickens sold or used for family use. To calculate the number of animal units for hogs, 3 mature hogs represented one unit and units of young hogs were calculated from a chart; "The Fractional Part of an Animal Unit Represented by Swine of Different Kinds and Weights," prepared by Earl D. Strait of the Office of Farm Management, United States Department of Agriculture.

TABLE II—DISTRIBUTION OF AVERAGE YIELD PER ACRE OF PRINCIPAL CROPS ON FARMS, WARREN COUNTY, IOWA; 832 farms 1915; 177 farms 1918, and 231 farms 1921.

	1915	1918	1921
Corn, bushels per acre	38	26	49
Wheat, bushels per acre	20	20	17
Oats, bushels per acre	26	39	27
Mixed hay, tons per acre	1.4	0.9	1.2

drought in 1918, but was of good quality. Hay also yielded low, but oats and wheat came thru with an average yield. Oats were frosted early in 1921 and then were caught by a heat wave in June and July and produced only a very light crop. Winter wheat yielded fairly well. Corn, tho injured by drought in July, gave an excellent crop in 1921. (See table II.)

DISTRIBUTION OF CAPITAL

The average capital per farm was determined in 1915 and 1918 by adding together the value of the real estate, livestock, machinery, feed and cash necessary to run the farm; first, as valued at the beginning of the year and again as valued at the close of the year and taking the average of these two sums. In 1921 the sum of the items at the beginning of the year only was used. The average capital invested per farm increased about $11,000 per farm from 1915 to 1918 as shown in table III. There was a small increase in capital from 1918 to 1921.

About $6,400 of the increase from 1915 to 1918 was due to the increase in the value of land from $117 to $158 per acre; $3,300 of the increase is accounted for by slightly larger farms, and the remainder principally by the rise in the value of machinery, feed and supplies. The percentage of investment which livestock represented decreased during the period partly as a result of the decrease in the average number of animal units kept as shown in table I, but more especially because values of land and machinery were more highly inflated than those of livestock.

TABLE III—AVERAGE DISTRIBUTION OF FARM CAPITAL ON FARMS, WARREN COUNTY, IOWA; 832 farms 1915; 177 farms 1918, and 231 farms 1921.

Items	1915		1918		1921	
	Capital	Percent of total	Capital	Percent of total	Capital	Percent of total
Real estate	$18,319	84.5	$27,945	86.6	$30,867	88.9
Livestock	2,410	11.1	2,410	7.4	2,199	6.4
Machinery	395	1.8	650	2.0	949	2.7
Feed and supplies	393	1.8	1,127	3.5	552	1.6
Cash to run farm	166	.8	144	.5	149	.4
Total	21,683	100.0	32,276	100.0	34,716	100.0

Approximately seven-eighths of the capital was invested in real estate in 1921 and one-eighth in livestock, machinery, feeds and supplies and cash to run the farm. The latter one-eighth is frequently called operating or working capital.

DISTRIBUTION OF FARM INCOME

Changes of considerable importance in the distribution of farm income took place between the periods of 1915, 1918 and 1921. Hogs, cattle and wheat are the outstanding cash enterprises. The percentage of income from hogs averaged about twice that of cattle, the next highest. In 1921 the percentage income from hogs, cattle and wheat was 32.2 percent, 12.2 percent and 7.9 percent, respectively. Dairy products were relatively more important as a source of income in 1921 than wheat, however. All other enterprises contributed less than 10 percent during any of the three years. The most noticeable changes in the relative returns were the increased income from dairy products in 1921, and the decrease in percentage of income from hogs and wheat during that year. On the average, approximately one-fourth of the total income came from the sale of crops and three-fourths from the sale of livestock and livestock products.

TABLE IV—AVERAGE DISTRIBUTION OF FARM INCOME ON FARMS, WARREN COUNTY, IOWA;
832 farms 1915; 177 farms 1918, and 231 farms 1921.

	1915		1918		1921	
	Average income	Percent of total	Average income	Percent of total	Average income	Percent of total
Cattle	$456	19.0	$757	17.0	$374	12.2
Hogs	641	26.7	1,735	39.1	992	32.3
Horses	148	6.2	58	1.3	24	.8
Sheep	42	1.7	19	.4	29	.9
Poultry	166	6.9	319	7.2	277	9.0
Dairy products	166	6.9	277	6.2	315	10.2
Total livestock	1,619	67.4	3,165	71.2	2,011	65.4
Corn	183	7.6	259	5.8	192	6.2
Wheat	255	10.6	541	12.2	244	7.9
Oats	31	1.3	117	2.6	42	1.4
Hay	34	1.3	37	.8	28	.9
Other crops	77	3.2	110	2.5	85	2.8
Total crops	580	24.0	1,064	23.9	591	19.2
Increased inventory of feed	38	1.6	..	...	161	5.2
Miscellaneous	38	1.6	48	1.1	68	2.2
House rent	129	5.4	156	3.8	245	8.0
Total	2,404	100.0	4,433	100.0	3,076	100.0

During the 10 years from 1880 to 1890 wheat nearly disappeared from the crop rotation in Warren county. It was replaced chiefly by oats, which in turn was being partly replaced by hay until 1911. Wheat came back into the rotation again in 1911 largely as a result of continued good prices and high yields. (Fig. 3.) The price of wheat has been steadily improving since 1906 and yields had likewise been above normal for several years. A combination of the same influences, however, operating in the opposite direction, was gradually eliminating wheat from the rotation when the price of wheat was guaranteed by the U. S. Food Administration in 1918 and the patriotic call was issued for more wheat. It is interesting to note, however, that with the return of wheat to the rotation following 1918, it did not displace oats, which had originally supplanted it. The area devoted to corn and oats was contracted to make room for the wheat. Oats are an essential feed for young cattle and dairy cows and with the increasing interest in dairying it is not likely that wheat will ever reclaim its former position of occupying the area devoted to oats.

Comparing the results for the three years, the changes in income from different sources were apparently due more to changes in price relations than to changes in farm organization. The decrease in the relative income from wheat in 1921 was a combination of less seeding and a declining price for wheat. In the case of oats, there was a marked increase in the percentage of the farm seeded to oats in 1921 as compared with 1918, yet the returns from oats in 1921 showed very little relative increase over 1918. This fact is explained first, by the low value per acre, due to the combined influence of low prices and low yields per acre, and second, by the fact that oats are used largely as a feed crop and a higher percentage was fed in 1921. Low yields of corn held down the average value per acre and tended to reduce the relative importance of corn as a direct source of income in 1918.

The value of items of food and shelter furnished by the farm to the family budget have been included as a part of the income of the various enterprises. Table V gives a list of the items and values of each which were included as a part of the farm income. Quantities were not available in all cases for the earlier years and these quantities have been estimated upon the basis of the quantities found in 1921. House rent was credited as an income at cost. House rent was distinctly higher in 1921, due to many new dwellings built during the prosperous years and partly due to increased valuation as estimated by the farmers in consequence of high replacement costs prevailing during the year. This increase does not affect the profits, however, because this credit is offset by expenses entered elsewhere. The value for the credit to farm business of house rent was obtained by

TABLE V—PERQUISITES FURNISHED BY THE FARM TO THE FAMILY BUDGET ON FARMS, WARRREN COUNTY, IOWA
832 farms 1915; 177 farms 1918, and 231 farms 1921.

	1915		1918		1921	
	Quantity	Value	Quantity	Value	Quantity	Value
Potatoes, garden and fruit		$40		$70		$59
Livestock products:						
Butter (pounds)	150 a	38	150 a	60	151	53
Cream (pints)	350 a	21	350 a	38	350	35
Milk (gallons)	260 a	31	260 a	65	260	39
Eggs (dozens)	185 a	31	185 a	56	185	37
Beef (lbs. live weight)	110 a	7	110 a	15	107	6
Pork (lbs. live weight)	650 a	41	695	111	612	46
Poultry (fowls)	45 a	22	46	37	43	37
Total		191		382		253
House rent:						
Repairs		16b		21b		28
Depreciation		41c		39		82
Interest @ 6%		62		85		120
Taxes and insurance		10d		11d		15d
Total		129		156		245
Total prequisites		360		608		557

(a) Quantities estimated from amounts found in 1921.
(b) Rate estimated at 1.5 percent.
(c) Rate estimated at 4 percent.
(d) Rate estimated at 3-4 percent.

combining the following costs: repairs, depreciation, taxes, insurance and interest at the rate of six percent.

DISTRIBUTION OF EXPENSES

The expense of operating these farms is shown in table VI. The expense of operation increased more than 100 percent from 1915 to 1918 and did not noticeably decrease any in 1921 despite the lower price levels for the products the farmers had for sale. Three items of expense secured in 1918 and 1921 were not considered the first year of the study; namely, auto expenses chargeable to farm business, telephone expense and depreciation on work horses, Depreciation on work horses, however, is shown as a deduction from total horse receipts. Had these items been included here for 1915, the total operating expense would probably have been increased by $125.

Feed purchased is the largest expense item in the operation of these farms. After feeds purchased, labor is the next largest item except that in 1921 taxes exceeded labor hired. Labor hired includes the value of board or perquisites furnished to the laborer. Taxes have more than doubled in the area since 1915.

The expense for repairs and depreciation of machinery, buildings and fences is of considerable importance. These items represent approximately 25 percent of the total farm expense.

TABLE VI—AVERAGE DISTRIBUTION OF FARM EXPENSES ON FARMS, WARREN COUNTY, IOWA;

832 farms 1915; 177 farms 1918, and 231 farms 1921.

Item of expense	Year					
	1915		1918		1921	
	Average am't.	Percent	Average am't.	Percent	Average am't.	Percent
Hired labor	$89 (a)	14	$149 (a)	11	$168 (b)	12
Feed purchased	198	31	372	27	185	14
Seeds	10	1	57	4	45	3
Twine	7	1	27	2	14	1
Threshing	24	4	51	4	38	3
Veterinary and vaccination	8	1	18	1	23	2
Horseshoeing	4	1	5	-	3	-
Breeding fees	12	2	9	-	4	-
Machine work hired	6	1	22	2	19	1
Repairs, machinery	9	1	24	2	53	4
Repairs, buildings	12	2	45	3	25	2
Repairs, fences	9	1	43	3	34	3
Fuel and oil	6	1	13	1	22	2
Auto expense for farm	- (c)		60	4	42	3
Insurance	13	2	23	2	25	2
Taxes	105	16	135	10	228	17
Other expenses	2 (d)	--	14	1	27	2
Total current	514	79	1,067	77	955	71
Depreciation, buildings	89 (e)	14	91	7	188	14
Depreciation, machinery	42	7	93	7	154	11
Depreciation, work stock	-- (f)		27	2	58	4
Decrease, feeds and supplies			98	7	--	--
Total	645	100	1,376	100	1,355	100

(a) Board of hired labor in 1915 and 1918 included only the actual cost of extra items purchased because of the hired man.

(b) Board of hired labor in 1921 included not only purchased items but also that furnished from the farm.

(c) Auto expense was not taken in 1915.

(d) Telephone expense was not taken in 1915.

(e) Depreciation on buildings not taken in 1915. The value is estimated by applying a rate of 4.2 percent on dwellings and 5.3 percent on other buildings.

(f) Depreciation of work horses not shown as an expense in 1915, but is deducted from horse receipts.

FINANCIAL SUMMARY OF THE FARM BUSINESS

All farms surveyed are grouped together by periods in table VII to show the financial structure of the average of all farms for each period. All farms have been summarized on a cash rent basis rather than upon the usual method of deducting five percent on total investment from net farm income to obtain a remainder, labor income. The reasons for the variation in method has been previously discussed under the section on method of study. It will perhaps be helpful in understanding the method of arriving at the deductions to be made from net farm income if the calculations are presented here in detail.

Net farm income			$1,721
Cash rental value[5]		$1,261	
Real estate taxes	$210		
Building insurance	10		
Building repairs	26		
Building depreciation	188		
Fence repairs	34		
Grass seed	19		
Total land charges		487	
Net rent			774
Interest on working capital, 8%			309
Family labor, including board			146
Operator's labor, including board			906
Profit or loss			—414[6]

The data in table VII show that the average net farm income was almost twice as much in 1918 as 1915. Very little change was registered, however, in net farm income in 1921 as compared with 1915. Net farm income, representing the combined earnings of farm capital and the farmer's labor and management, is some indication of the size of the business conducted and of the prosperity of groups of farms.

Profits, representing the returns for the operator's function as a manager, averaged $491 on 832 farms in 1915 and $889 on 177 farms in 1918. Attention is called to the fact just above that average net farm incomes were approximately equal in 1915 and 1921. Yet the average farm made a profit of $491 in 1915 while the average farm in 1921 showed a loss of $414. Gross incomes were larger in 1921 as compared with 1915, but the increase was not nearly sufficient to cover the increased expenses. The increases in current expenses alone were more than equal to the increases in income. Increased rents, higher interest rates and higher labor rates were to a very large extent responsible for the losses incurred in 1921.

Making allowance for the decreased purchasing power of the dollar, farmers were unquestionably enjoying more prosperity in this area in 1918 than in 1915; on the other hand, they were in the trough of the depression in 1921. The proportional relationship between gross incomes for the three years follow remarkably closely the proportions expressed by a price index of all farm records. The Bureau of Labor's Farm Products Index was 104 for 1915, 218 for 1918 and 124 for 1921. It was not so much the lower price level of the commodities which the farmer had to sell in 1921 that affected his profits, as compared with 1913, but rather the condition which made it impossible for him

[5]Assuming that all farmers paid cash rent.
[6]The minus sign (-) denotes loss.

TABLE VII—FINANCIAL SUMMARY OF FARMS, WARREN COUNTY, IOWA;

832 farms 1915; 177 farms 1918, and 231 farms 1921.

	1915		1918		1921	
	Average value	Percent of total	Average value	Percent of total	Average value	Percent of total
Average size, acres	156		177		174	
Investment: (a)						
Real estate	$18,319	84.5	$27,945	86.6	$30,867	88.9
Livestock	2,410	11.1	2,410	7.4	2,199	6.4
Machinery	395	1.8	650	2.0	949	2.7
Feed and supplies (b)	393	1.8	1,127	3.5	552	1.6
Cash to run farm	166	.8	144	.5	149	.4
Total	21,683	100.0	32,276	100.0	34,716	100.0
Income:						
Crops (c) (d)	580	24.0	1,064	23.9	591	19.2
Livestock (d)	1,619	67.4	3,165	71.2	2,011	65.4
Increased inventory feed and supplies	38	1.6	--	--	161	5.2
Miscellaneous	38	1.6	48	1.1	68	2.2
House rent (e)	129	5.4	156	3.8	245	8.0
Total	2,404	100.0	4.433	100.0	3.076	100.0
Expenses:						
Labor hired	89	13.7	149	10.8	168	12.4
Feeds purchased	198	30.7	372	27.1	185	13.7
Taxes and insurance	118	18.4	158	11.5	253	18.7
Other current expenses	109	16.9	388	28.2	349	25.7
Decrease feed and supplies	---		98	7.1	---	---
Depreciation	131	20.3	211	15.3	400	9.5
Total	645	100.0	1,376	100.0	1,355	100.0
Net farm income	1,759		3,057		1,721	
Distribution of net income:	(g)		(g)			
Net rent	421	23.9	726	23.7	774	45.0
Interest on working capital (h)	219	12.5	346	11.3	309	18.0
Family labor	85	4.8	213	7.0	146	8.5
Labor of operator	(i) 543	30.9	883	28.9	906	52.6
Profit or loss	491	27.9	889	29.1	-414	-24.1
Total	1,759	100.0	3,057	100.0	1,721	100.0

(a) Investment in 1915 and 1918 was derived by averaging the values at the beginning and end of the year. Investment in 1921 is the value at the beginning of the year.
(b) Crops carried over from the previous year and sold during the current year were not included in the opening inventory in 1915 and 1918 but were included in 1921.
(c) Crops carried over from the previous year were not included in crop sales in 1915 and 1918 but were included in 1921.
(d) The value of food grown on the farm and used by the family was not obtained for all products in 1915 and 1918. These values have been estimated and included here to make the figures for the three years comparable. (See table V).
(e) See table V.

(Footnote continued on page 23)

(f) Depreciation on buildings was not obtained in 1915. It is estimated here by applying 4.2 percent on dwellings and 5.3 percent on other buildings, respectively.

(g) Net rent was estimated at 2.3 percent of the average real estate valuation in 1915, and 2.6 percent of the value in 1918. These figures were approximated from known returns of 2.10 percent on 87 of the farms included in the survey which were cash rented in 1915 and 2.62 on nine cash rented farms in 1918. For method of calculation see page 21.

(h) Rate of 6½ percent in 1915; 8 percent in 1918 and 1921.

(i) The value of operators labor exclusive of the value of board averaged $303 in 1915, and $583 in 1918. To these figures have been added $240 and $300, respectively, as the added expense of the board above farm wages. Value of operator's board was obtained in 1921.

to affect a hurried readjustment in his farm expenses. The data have demonstrated that rents, depreciation, taxes, labor and interest charges were remarkably high in 1921. This lag of adjustment, however, is characteristic of fixed charges in any swing of economic cycles.

SUMMARY OF FARM BUSINESS FOR DIFFERENT TENURES

The reader will have noticed that in all tables presented thus far, farms operated by owners, part owners, share renters, cash renters, stock-share renters and mixed tenures have been grouped together and considered as one class. Whenever profits have ben calculated, net rents have been charged on total acres and interest on working capital has been charged on the total amount invested in the farm business, whether that represented only a complete farm business unit of the operator or the combined resources of the operator and one or more landlords. All items of income and expense were considered as tho they belonged to a farm owner and were credited or charged to the farm business accordingly. This was necessary in order to make the farms operated by owners, owner's-additional, and tenants comparable as to rental or interest charges. The primary objective in this study is to determine the factors of organization and management that influence farm profits from a farm business unit and only secondarily the effect of different forms of tenure on farm profits.

Table VIII shows, however, that the type of tenure was an important factor in determining the operator's profits. In this table the farms of the area surveyed are grouped into five classes according to tenure: (1) those operated by owners; (2) those operated by part owners; (3) those operated by cash tenants; (4) those operated by grain share tenants; (5) those operated by stock-share tenants. There were 90 farms in the first class, 41 in the second, 13 in the third, 38 in the fourth and 33 in the fifth. Of the 231 farms surveyed in 1921, 16 were omitted from the classification here because they were mixed tenure and were not typical of any particular class.

TABLE VIII. FINANCIAL SUMMARY OF FARM BUSINESS FOR DIFFERENT TENURES—231 Farms; Year 1921.

Tenure		Owners	Owners additional			Cash renters			Share renters			Stock-share renters		
Number of farms		90	41			13			38			33		
		Farm	Farm	Operator	Landlord	Farm	Operator	Landlord	Farm	Operator	Landlord	Farm	Operator	Landlord
Average size of farm		152	178			138			157			229		
Invest.	Real estate	28,459	31,068	21,192	9,876	21,129		21,129	26,918		26,918	39,315	665	38,650
	Livestock	2,057	1,967	1,967		2,009	2,009		1,529	1,529		3,182	1,724	1,458
	Machinery	954	1,102	1,102		738	738		695	695		1,063	831	232
	Feed and supplies	523	610	610		392	392		390	390		776	440	336
	Cash to run farm	137	114	114		112	112		91	91		239	156	83
	Total	32,130	34 861	24,985	9,876	24,380	3,251	21,129	29,623	2,705	26,918	44,575	3,816	40,759
Income:	Crops	362	779	502	277	296	287	9	918	246	714	663	363	300
	Livestock	1,945	1,742	1,742		2,131	2,131		1,511	1,511		2,444	1,409	1,035
	In'c'rse feed, sup.	205	193	193		207	207					168	104	64
	Other sources	56	86	86	97	19	19	1,106	114	114	247	33	33	9
	House rent	270	249	249		203	203		181	181		252	252	
	Total	2,838	3,049	2,772	374	2,856	2,847	1,115	2,727	2,052	961	3,560	2,161	1,408
Farm Exp.	Labor hired	141	151	151		132	132		133	133		382	379	3
	Feed purchased	206	145	145		167	167		124	166		242	130	112
	Taxes and insurance	226	256	256		218	35	183	218	28	190	307	72	235
	Other current	355	356	384	69	281	1,329	58	283	461	69	334	122	221
	Depreciation	345	350	344	6	296	133	163	272	117	150	405	133	272
	Total	1,273	1,258	1,280	75	1,094	1,796	404	1,030	905	411	1,670	836	843
Net farm income		1,565	1,791	1,492	299	1,762	1,051	711	1,697	1,147	550	1,890	1,325	565
Distribution net income														
	Net rent (a)	683	736	449	287	711		711	687		687	945		945
	Int., working capital	292	304	304		260	260		216	216		431	263	168
	Family labor	158	217	217		3	3		82	82		95	95	
	Value farmer's labor	899	879	879		931	931		863	840	23	229	909	20
	Profit or loss	-467	-345	-357	12	-143	-143		-151	9	-160	-510	58	-568
	Total	1,565	1,791	1,492	299	1,762	1,051	711	1,697	1,147	550	1,890	1,325	565

(a) Net rent is an imputed figure designed to establish an allowance to real estate investments. It is the net proceeds of an estimated cash-rental value. The method used to determine the net returns earned by real estate investments was to deduct imputed interest and labor charges from landlord's net farm income to obtain the net residium available for returns to real estate.

The average stock-share farm of 299 acres represented a combined landlord's and tenant's investment of $44,575. These farms had both a larger investment and a larger acreage than the farms of any of the other tenure groups. The owner-additional group ranked next to the stock share farms in this respect. The average cash tenant farm represented the smallest number of acres and the lowest investment. Owner farms were smaller than share rented farms, but represented a higher investment. The cash tenant farms had an average net farm income approximately as large as any other group except the stock share group, even tho smaller in size. The average expense on the cash rent farms, however, was not so large and it was by the saving in expense that they came out ahead with an average farm loss of $143 as compared to $151 on the share rented farms, $345 on the owner-additional, $467 on the owner and $510 on the stock-share. The stock-share farms had the highest average net farm income, but the higher net rent and higher interest charge on the larger investment created a greater loss.

Considering only the operator's profits, the stock-share operators were far ahead of owner operators and somewhat ahead of either cash or share tenants. Under the conditions prevailing in 1921, share tenants, whether operating under stock or grain share leases, profited at the landlord's expense by having an advantage in the rental contract as compared to the cash tenant. The prices of grain and livestock in the case of the stock-share lease were low and the landlord's share for rent did not equal an amount that he might have received under a cash rent contract. The tenant profited by the difference and consequently the landlord did not have sufficient income to meet investment charges. The average losses incurred by landlords who rented for a share of the product, as shown in table VIII, stands as evidence to this fact.

Assuming that the grain share lease represented an equitable division of the returns between landlord and tenant under the conditions prevailing during 1921, the cash tenants paid, on the average, approximately $150 more in cash rent than the landlord's share of the grain would have netted on the market. It would be safe to conclude on this basis that cash rents were approximately one dollar per acre, on the average, above the returns from the landlord's grain share for the crop year of 1921. Even with this advantage the landlords who rented for cash earned only 3.4 percent on their investment.

Naturally, in the face of the conditions described above, the landlords who rented for a share of the products realized an even smaller net return on their investment in real estate. The calculated rate of net return is two percent for the grain share and .98 percent for the stock-share farms. Thus the net returns

on investments in real estate were universally low. They could have been raised by higher rents, but rents were already too high. It is possible that land charges, particularly taxes, may be less in the future; but the rate of net returns on real estate can be permanently raised only by depreciating the value of the real estate to a level commensurate with its productive earning capacity. The high values attributed to real estate on many of these farms at the time of the survey practically eliminated the possibility of a reasonable net return.

The men on the owned farms apparently were not in a position to cut expenses to the exetnt that the tenant operators did. Perhaps in some cases they did not feel the extreme necessity of doing so. Depreciation and labor expenses, family labor particularly, were higher on owned farms. The owners put more money into repairs during the year than was put on the rented farms by the landlords. Automobile expense chargeable to the farm was also highest on the owned farms.

VARIATION IN PROFITS

Fig. 7 shows a classification of farms according to amount of profits realized during the last year of this study. Despite the fact that the greater number showed a loss rather than a profit and that the average profit of the 231 farmers was extremely low, there should be some encouragement for the farmer in a study of the records and the profits obtained by the different operators. For one thing, the 25 most profitable farms each made an average of $3,261 more than the 25 least profitable farms. This difference measures the difference between success and failure and by giving careful attention to the differences in the organization and management of these farms, we may find some of the significant principles of better farming for higher profits.

FACTORS AFFECTING THE SUCCESSFUL OPERATION OF FARMS

We now turn to the third objective,—the determination of the factors that make for success or failure in farm organization and management, and to measure, if possible, the relative importance of these factors when applied to individual farms.

The data on the 231 farms surveyed in 1921 were most carefully analyzed and are used more often to demonstrate points made in the discussion, but the data of previous years have been carefully tabulated and substantiate conclusions drawn from later study. This study reveals a number of factors which can be classified in four main groups: (1) size of business, (2) combination and proportionment of business enterprises, (3) effi-

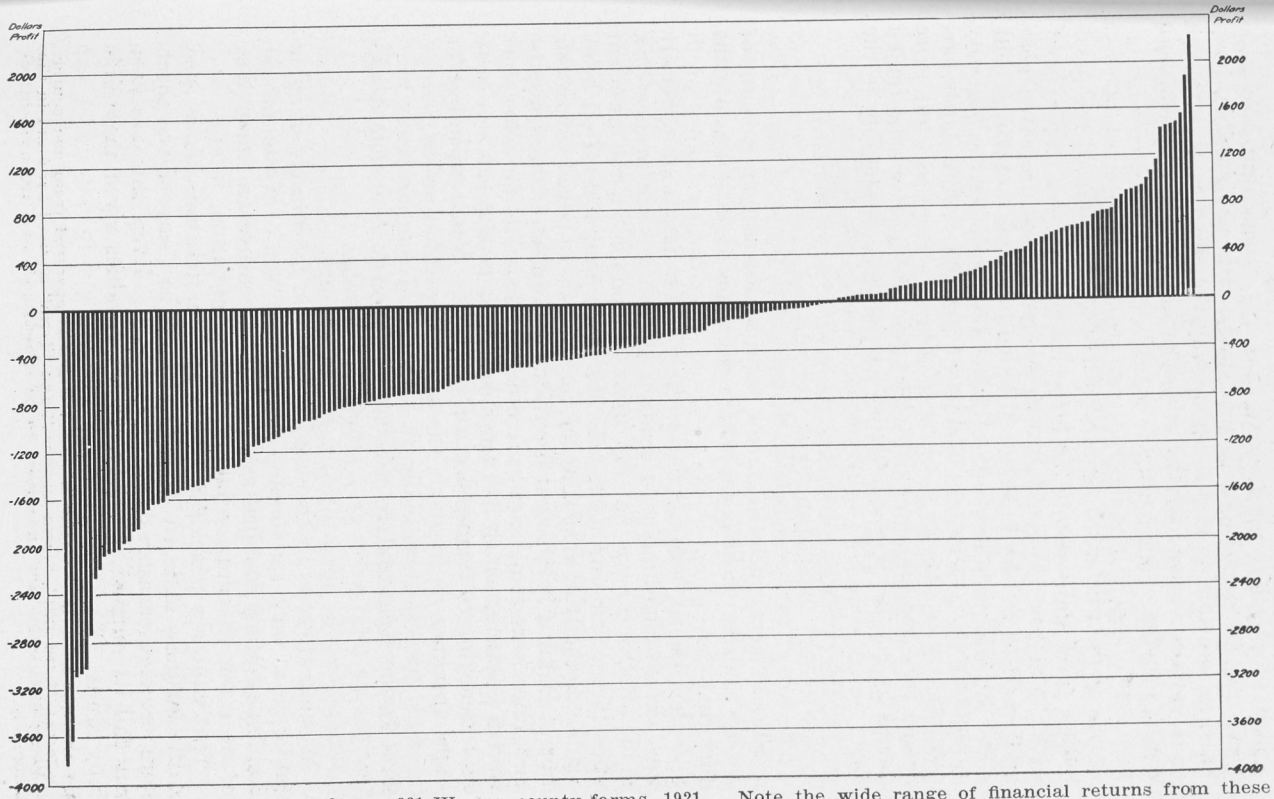

Fig. 7. Distribution of farm profits on 231 Warren county farms, 1921. Note the wide range of financial returns from these farms.

ciency in physical production, and (4) bargaining efficiency. From the facts gathered in this study, it is not possible, however, to ascertain in any complete way the effect that variations in the prices received for the produce of the farm had upon their relative profits.

THE SIZE OF THE FARM BUSINESS

The farm unit[7] should be large enough to give employment with the highest net return to the productive resources available and retained by the farmer. It should be such usually as will allow the minimum amounts of labor and equipment to the production of the maximum amounts of product. This size, when measured in number of acres, will naturally vary with the type of soil, line of production and with labor and market conditions; it will also vary with the ability of the farmer himself.

MEASURE OF SIZE IN FARM UNITS

The size of farms is usually thought of in terms of area. The number of acres included in the farm is satisfactory as a measure of the size of business where the type of farming is very uniform.

To be strictly comparable on this basis, farms of different sizes should have under cultivation about the same proportions of the area, and have the crop areas divided among the different crops in the same proportions. Moreover, they should all have similar methods of disposing of the crops. In areas where the type of farming is mixed, it is obvious that all land is not equally useful and that some uses have different demands for labor and capital per acre, which in turn means that profits per acre will vary according to the use made of the land. Farm capital, generally speaking, is in about the same proportion as the size of the farm in acres, especially in a region of comparatively uniform land values and is, therefore, subject to the same qualifications as total acres as a measure of size.

Where figures are available on the amount of labor utilized in growing of crops and caring for livestock, the amount of labor would be a very satisfactory measure of size. While not so simple and easily handled as these other measures, a summation of the input charges for labor, rent, depreciation, interest and current expenses probably affords a better measure of the size of the business done on different farms than any of the three more common measures suggested above. Even this measure may fail its purpose, however, when the values given these dif-

[7]A farm unit comprises a farm buisness which is operated from one center. The terms "farm unit", "farm business" and "farm" as used here and in the following discussions are understood to be synonymous and are used interchangeably.

TABLE IX—RELATION OF SIZE OF FARM TO EFFICIENCY IN USE OF MAN LABOR

231 Farms; Year 1921

Size of farm	No. of farms	Average no. of men per farm	Acres of crops per man	No. of animal units per man	Acres in crops	Productive animal units per farm
100 and under	46	1.1	49	16.1	54	17.7
101 to 140	50	1.2	66	19.5	79	23.4
141 to 180	59	1.3	77	21.2	100	27.5
181 to 220	27	1.6	71	22.2	114	35.5
221 to 260	19	1.8	76	24.3	136	43.8
261 to 300	11	1.9	85	24.7	162	46.9
301 and over	19	2.4	85	28.7	204	68.9

ferent input factors do not show the natural differences in the productiveness of different units. This difficulty is most apt to arise with imputed labor charges and rents.

For the purpose of examining some of the economies of size in the efficient utilization of labor and equipment, total acres is used as the measure of the size of the farm.

HOW AND WHY SIZE AFFECTS ECONOMY

Economies result from developing the unused capacities of productive factors. Each unit of these productive factors performs more services on the larger farm for the following reasons:

(1) The larger farm permits the use of more of the operator's time poductively. Moreover, there are many farm tasks which cannot be done conveniently without the cooperation of two or more men.

(2) The man on the large farm drives more horses hitched to larger machinery and, in addition, he uses his horses a greater number of days during the year.

(3) Machinery is used to a greater capacity and, furthermore, more labor-saving machinery is purchased, such as tractors, trucks and harvesters.

(4) The buildings of one farmstead serve more acres and more animals.

TABLE X—RELATION OF SIZE OF FARM TO EFFICIENCY IN USE OF HORSE LABOR

Size of farm acres	No. of farms	Acres in crops	No. work horses	Acres of crops per horse
100 and under	46	54	4.2	12.8
101 to 140	50	79	5.5	14.4
141 to 180	59	100	6.5	15.4
181 to 200	27	114	7.0	16.3
221 to 260	19	136	8.2	16.6
261 to 300	11	162	8.0	20.2
301 and over	19	204	9.0	22.7

TABLE XI—RELATION OF SIZE OF FARM TO EFFICIENT USE OF MACHINERY

231 Farms; Year 1921

Size of farm acres	No. of farms	Value of machinery	Crop acres	Val. machinery per crop acre
100 and under	46	$627	54	$11.61
101 to 140	50	738	79	9.34
141 to 180	59	976	100	9.76
181 to 200	27	1,103	114	9.76
221 to 260	19	1,019	136	7.49
261 to 300	11	1,142	162	7.04
301 and over	19	1,798	204	8.81

Effective use of man labor.—One of the important economies of the large farm is shown in table IX. As the size of the farm increased, one man cared for more acres of crops and a larger number of animal units. On the farms of 100 acres or less, one man cared for only 49 acres of crops and 16.1 animal units. On farms of 101 to 140 acres, 66 acres of crop per man were grown and 19.5 animal units cared for. The efficiency in the use of man labor increased consistently as the size of the farms increased. On farms of 301 acres and larger, one man handled 85 acres of crops and 28.7 animal units.

The number of acres of crops per man increased 73 percent and number of animal units 74 percent as between the largest size farms compared to the smallest. Increasing the crop acres per man and animal units per man approximately 75 percent means a considerable saving in the use of labor.

Effective use of horse labor.—Horse labor was also more efficiently used on the larger farms than on the smaller ones (table X). The farms of 100 acres and less kept on the average only 4.2 horses, but each horse cared for only 12.8 acres of crops. Farms averaging over 300 acres in size kept 9 horses and raised 22.7 acres of crops per horse. There was an increase of practically 100 percent in efficiency in the use of horse labor from the lowest range in size to the highest range.

Size and investment in machinery per acre.—Since machinery has replaced man and horse labor to such a considerable extent on many farms, it is quite important that the farm be large enough to justify the purchase of the standard machines and to use them as efficiently as possible. Table XI shows that the investment necessary per crop acre for machinery steadily decreased as the size of farms increased except on the very large farms. Some of these farms had tractors and threshing outfits, which increased the value of machinery per acre.

TABLE XII—SIZE OF FARM AND DISTRIBUTION OF CAPITAL
231 Farms; Year 1921

Size of farm	No. of farms	Total capital	Percent of total capital in—						
			Land	Dwelling	Other buildings	Machinery	Livestock	Feed, supplies	Cash
100 & under	46	$18,969	72.8	8.5	7.8	3.2	5.8	1.5	.4
101 to 140	50	24,164	73.8	7.8	6.7	3.0	7.4	1.5	.4
141 to 180	59	32,468	78.3	5.9	5.3	3.0	5.5	1.5	.5
181 to 200	27	40,113	78.2	4.9	5.4	2.7	6.6	1.8	.4
221 to 260	19	44,658	80.7	4.1	4.5	2.3	6.6	1.4	.4
261 to 300	11	48,294	78.9	3.9	5.7	2.4	6.8	1.7	.6
301 and over	19	82,103	80.1	4.0	5.2	2.2	6.4	1.7	.4

SIZE AND CROP YIELDS

Grouping the farms according to size to determine the effect of size on the yields per acre of the leading crops, we find as shown in table IX that there is no definite relationship between size of farm and crop yields as expressed by crop index[8]. It is of significance, however, that there is not any noticable tendency toward a decrease in yields as the size of farm increases.

The total investment ranged from $627 on the smallest farms to $1,798 on the largest. On the smallest farms, averaging 100 acres or less, the machinery investment was $11.61 per acre, while the smallest investment of $7.04 per acre was on the 261 to 300 acre farms. Large farms not only have a lower investment per acre, but in most cases have labor saving machines which cannot be afforded on smaller farms. Altho there is a noticeable variation in investment per acre for machinery on different farms, the saving in expense is not great when compared to the efficiency possible in use of man and horse labor.

Size of farm and investment in buildings.—Additional opportunities for saving in overhead expenses are offered by increasing

[8]The crop index expresses on a percentage basis the crop yields of an individual farm compared with the average yields of the farms surveyed. All crops and their proportionate areas are considered. The method commonly used in finding the crop index of a given farm is to divide the quantity of field crop produced on the farm by the average yield of that crop per acre on all the farms. The quotients obtained from these divisions are added and their sum divided by the crop area of the farm. For example:

Crop	Area in crop on given farm		Total yield on given farm		Average yield on all farms		Area that would have been required to produce same amount with average yields
Corn	23 Acres		1,150 bu.	÷	48 bu.	=	24 Acres
Wheat	16 Acres		480 bu.	÷	18 bu.	=	27 Acres
Oats	12 Acres		384 bu.	÷	27.bu.	=	14 Acres
Hay	2 Acres		2 T.	÷	1.3 T.	=	2 Acres
	53						67

(67 ÷ 53) × 100 = 126, crop index.

TABLE XIII—RELATION OF SIZE OF FARM TO CROP YIELDS

231 Farms; Year 1921

Size of farm—acres	No of farms	Average yield				Crop index
		Corn	Wheat	Oats	Hay	
100 and under	46	46.8	18.7	27.1	1.6	100.3
101 to 140	50	48.0	18.6	26.2	1.2	98.4
141 to 180	59	48.5	17.0	26.1	1.2	97.9
181 to 220	29	48.2	18.5	26.1	1.2	101.7
221 to 260	19	53.6	20.1	27.5	1.2	107.7
261 to 300	11	42.9	15.3	25.1	1.0	87.7
301 and over	19	48.3	17.1	28.5	1.3	104.4

the amount of land associated wtih one farmstead. Table XII shows the distribution of the capital between land, dwellings, other buildings, machinery, livestock, feed and supplies and cash necessary to run the farm. The percentage of capital invested in the dwelling decreased more rapidly than does the percent of total capital in other buildings as the size of the farm is increased.

PERCENT OF LAND IN CROPS ON FARMS OF DIFFERENT SIZES

Mention has already been made that farms should have approximately the same proportions of both cultivated area and crop selections if they are to be comparable for the purposes of bringing out the average differences due to the factor, size. Table XIV shows that these 231 farms differed widely in these respects and, furthermore, there is a noticeable relation between the variations and the size of the farm in acres. It is evident from table XIV that small farms were cropped more heavily than the larger farms. As the size of the farm increases, the percentage of land in pasture increases rapidly and consistently; percentage in small grains remains practically constant with a tendency to increase; while the percentage in corn decreases decidedly. Large farms seem to be the result of large areas of

TABLE XIV—RELATION OF SIZE OF FARM TO PERCENT OF LAND IN CROPS

231 Farms; Year 1921

Size of farm acres	Number of farms	Percent in pasture	Percent in crops	
			Corn	Small grains
100 and under	46	29.2	34.0	19.9
101 to 140	50	28.7	32.5	21.2
141 to 180	59	33.4	28.2	23.0
181 to 220	27	37.0	24.7	21.4
221 to 260	19	37.2	24.9	20.6
261 to 300	11	35.4	21.7	25.1
300 and over	19	41.4	23.4	21.1

pasture rather than the cause of a high percentage of pasture. The range of the percent in pasture was from an average of 29.2 percent on farms of 100 acres and under to 41.4 percent on farms of 301 acres and over. The area in small grains averaged approximately 20 percent on all farms. There was an absolute increase in acres in corn as the size of the farm increased, but this increase was not proportionate to the increase in the size of the farm.

RELATION BETWEEN THE SIZE OF THE FARM AND PROFITS

In the final analysis, the deciding financial factor which should determine the most desirable size for the farm is the profits derived from farms of different sizes. Thus far the analysis has indicated that with all other factors the same in a large business as in a small one, the large business will return the greater profit, first, because there are more units functioning under one management to create profits and, second, there are certain efficiencies possible in the use of labor and equipment on the larger farms which cannot be attained in the smaller organization.

Before examining the relation between farms of different size and profits, however, it is well to summarize some of the differences in type of farming and farm practices that are found on farms of different sizes. As a first and major consideration, the farms in the larger groups have a much higher percentage of the farm area used for pasture and hay. Moreover, the larger farms likewise have a higher percentage of the crop area in small grains. Thus, on the whole, the larger farms are much less intensively farmed. Second, notwithstanding the fact that pasture areas are not as productive in terms of financial returns as crop land, farms with large pasture areas were valued, and rented or estimated to rent, at an average value per ace which, in comparison to the rent charges on the more intensely cultivated farms, does not reflect the difference in profit-earning capacity between the different uses to which the land was put. Furthermore, as the size of the farm increases and percentage of pasture increases, the larger pasture areas are not used as efficiently as the smaller pasture areas. This is partly because not enough livestock is kept to utilize the pasture to its fullest capacity. Cattle feeding resulted in heavy losses in most cases and practically all the cattle feeding was found on large farms.

A comparison, therefore, in tabular form of groups of farms classified on the basis of size, using any one of the measures previously mentioned, will not show average differences in profits due to size of the farm alone. This is true because none of the measures can be depended upon to group together in a size group farms which are the same in all respects except size. Nevertheless, a comparison using total acres as a measure of

TABLE XV—AVERAGE PROFITS OF GROUPS OF FARMS CLASSIFIED ACCORDING TO FARM AREA

231 Farms; Year 1921

Size of farm acres	Number of farms	Average size of farm	Profits
100 and under	46	86	$-127.
101 to 180	109	144	-417.
181 to 260	46	216	-409.
261 and over	30	357	-860.

size is inserted here because it brings out very decidedly the practical effect on profits of a combination of factors closely associated with the area of the farm in this region. Table XV shows the relation between different groups of farms classified on the basis of area and profits.

It is obvious from table XV that the large farms measured on the basis of area were less profitable in this region in 1921. No doubt some of the men on large farms had taken advantage of the favorable relations between prices and costs during the period of inflated prices which had only recently passed to expand their operations and were not foresighted enough to readjust the size of their operations to avoid losses on these marginal expansions when prices dropped without a corresponding recession in the level of costs. These men lost, of course, thru control of a business which was too large.

Taken on the average, tho, the relation between the area of the farm and profits indicates that when farms differed in size only and were alike in all other respects, an extension of the operations was slightly profitable. Each additional acre increase under these circumstances was responsible on the average for an increase of $6.31 in the final profits[9].

It must be concluded, therefore, that large farms in this area were on the whole less profitable than smaller farms, not because large farms when organized on the same basis as smaller ones were not able to maintain the same efficiency, but because, as already pointed out, the large farms were large as a result of the addition of pasture land of relatively low productive capacity, which was not sufficiently discriminated against in the rent account and for other reasons pointed out which were concomitant with an increase in area.

CONTROLLING THE SIZE OF THE BUSINESS.

The relative efficiencies of production on farms of different sizes favor the larger farm unit. Farms as physical units of production, however, have an indefinite but real limit to the

[9]The net regression computation shows that as an average condition an additional acre increased profits $6.31.

size at which they can be effectively worked. Moreover, men in exercising their management functions have personal limitations which are a matter of natural endowment and experience, which make it possible for some farmers to handle effectively larger units than others. The proper size of farm within even a limited area becomes, then, an individual problem for each operator. Generally speaking, each operator should be urged sufficiently by the efficiencies inherent in larger units to come up to the limits of his management ability or finally to the limits of size which can be conveniently managed as one physical unit.

In addition to these more or less permanent considerations, there is the matter of controlling size in harmony with price fluctuations. Trade activity and rising prices favor expansion of the size of the business unit regardless of its present size. On the other hand, during periods of rapidly declining prices it is usually good economy to reduce the size of the business, particularly if it has previously expanded with rising prices, to the point of utilizing only those resources which cannot be shifted to other producers or other industries.

On the basis of these principles, if the farmer at any particular time decides that expansion will be profitable there are two general means by which the size of the farm business may be increased: (1) the acreage in crops may be increased either by the purchase or the renting of additional land, or perhaps by improving some wet or otherwise untillable land already owned; and (2) the farming may be made more intensive by increasing the proportion of the farm in corn and small grains, which will require the use of more labor. More capital and labor may also be utilized by keeping more livestock or changing from the production of meat animals to dairying.

Just which method the farmer should choose who wishes to expand his business, will depend upon the occasion for expansion, the present size of his farm, and the degree of intensity of present operation. The farmer who possesses additional managerial capacity will probably be planning to expand as a permanent proposition and can enlarge his investment in fixed and semi-fixed assets with safety. On the other hand, the man who only is attempting to follow business cycles should be very cautious about entering into any long-time obligations in order to expand. He had better rent extra acres rather than purchase, or perhaps he can accomplish the same end by more intensive cultivation of his present area. The same principle should be observed in the expansion of livestock enterprises. There are types of livestock production which can be gotten into quickly and out of quickly, while other types are shifted more slowly. The hog enterprise is an example of the former, while dairying is an example of the latter.

CHOICE AND COMBINATIONS OF ENTERPRISES

The use of the term "choice of enterprises" leads the discussion directly into the field of what and how much to produce. The question of what to produce in any community where the type of farming is fairly well fixed, as it is in most Iowa communities, has been pretty well mapped out by the experience of preceding farming generations. The crops being grown by the majority of farmers successfully in any community are usually best adapted to that community and only permanent changes in economic conditions will change the choice of crops to be grown. Soil, climate and markets limit the choice of crops to a narrow range. New crops are being discovered from time to time which are adapted to different communities, but they usually supplant some crop which is already being grown, rather than fitting into the rotation as an additional crop. Available feeds, condition of the markets, labor supply and the means of the farmer together with his personal training or preference largely determine the kinds and amounts of livestock kept.

If, however, "choice" is interpreted to mean selecting proportions and combinations of crops and livestock enterprises, there is an opportunity for improvement in the organization of many farms. "The problem of the adjustment of the livestock enterprises so as to use to the best advantage the crops grown, as well as the adjustment of both crops and livestock to the available supply of labor and of other resources at the farmer's command, offers a fertile field of study and undoubtedly is of more or less importance on every farm."[10] The problem of changing market conditions attaches additional importance to the matter of changing proportions of crop and livestock enterprises. There is no such thing as a constant price relationship between commodities. The prices of practically all commodities move in cycles and cycles of different commodities seldom coincide. Changes in farm organization cannot be made on every change in price quotations, but the organization should be made to fit the long swings in prices so far as practicably possible.

Tho not so evident on the surface, there is a most profitable magnitude for the different enterprises on these farms. Within certain limits, a farm enterprise contributes to profits most effectively when it is maintained in a definite relationship to the group of enterprises being operated in conjunction with it. Generally speaking, farmers in older farming sections have arrived at some notion of the optimum magnitude for the various enterprises they maintain on their farms. Their methods of choosing enterprises is clearly traditional and based on individual ex-

[10]Pond, G. A., The Use of Detailed Cost Studies in Improving Farm Organization in a Community. Journal of Farm Economics. Vol. VI. No. 1. pp. 70-84, January, 1924.

TABLE XVI—RELATION OF PERCENT OF FARM IN PASTURE TO PROFITS

231 Farms; Year 1921

Percent of farm in pasture	Number of farms	Av. percent in pasture	Profits
20 and under	39	14.0	$-265
21 to 30	71	25.9	-301
31 to 40	62	35.4	-328
41 to 50	32	45.1	-343
51 and over	27	59.4	-1038

perience, however, and since they do not as a rule clearly perceive the more or less obscure economic forces which prompted them in their choice, they are constantly in a state of bewilderment in this matter of relative magnitudes of the different enterprises.

Determining the proportions of crop enterprises is a matter of utilizing the farm land. The principal crops of this area are, as previously stated, corn, wheat, oats and hay. Much of the farm area, however, is not suited to cropping and is used for permanent pasture.

PASTURE

Some pasture, of course, is essential on all farms to carry the livestock necessarily associated with a general type of farming. Moreover, when the farm includes more rough or otherwise untillable area than is required to furnish sufficient pasture to satisfy the minimum requirement, it becomes necessary to adjust the type of farming to a system which will utilize the additional pasture. The adjustment is commonly effected in this area by expanding the cattle enterprise.

Under the conditions existing during the last year of this study, it appears that combinations of crop land and pasture in which pasture represented more than 20 percent of the farm area were less profitabe than farms having approximatey 20 percent or less. In view of the fact, however, that some farms have more than 20 percent of the are which is not topographically adapted to cropping, the results of the tabulations (table XVI) are not to be interpreted to signify that all farmers having more than 20 percent of the farm in pasture were making a mistake by not attempting to crop more of their farms. The use of rough land as pasture, in addition to the 20 percent, undoubtedly represented in most cases the best use to which it could be put.

It is evident, however, that farms with a high percentage of pasture were on the whole less profitable. Because of an adverse economic situation, any use to which the land was put resulted in a loss in 1921 when considered from the standpoint of the value of the product equalling cost of production. Nevertheless,

some forms of utilization were more profitable than others in averting losses, and it is significant that all crops gave a more profitable return for the use of the area occupied than did pasture.

Closer examination of the records of farms with large pasture areas reveals several aspects of unprofitable organization and management of the pasture enterprise. The common failure to recognize the lower income yielding capacity of most pasture land as compared to crop land, and the resulting tendency to over-capitalize pasture land, has an application here. These farmers did not seem to appreciate these differences in value when estimating their investment in real estate and, moreover, the purchase price of many pasture farms which are being transferred proves to be too high. Rents in general proved to be much too high during the year[11], but even so, it is felt that the usual discriminations in favor of lower rents for pasture were not present in the minds of the farmers if the rents paid can be taken as a criterion.

Closely associated with the condition just mentioned was the poor physical condition of the pastures themselves. Many of the pastures needed renovating and reseeding. In this connection, too, a better selection in the grade and class of livestock pastured would have increased the income from the pastures. More will be said about efficiency in the use of pastures later.

CROPS

Those parts of the farms not in pasture or waste land were, naturally, devoted to crops. Table XVII shows the average profits for groups of farms having different percentages of the farm

TABLE XVII—RELATION OF PERCENT OF FARM AREA IN CROPS TO PROFITS

231 Farms; Year 1921

Percent of farm in crops	No. of farms	Average percent in crops	Percent of receipts from crops	Profits
50 and under	47	40.4	18.6	$-682
51 to 60	61	56.3	27.0	-441
60 to 70	70	65.8	30.0	-339
71 and over	53	77.2	36.7	-214

[11]The net relation between the value of the real estate per acre and profits is interesting in this connection. The net regrssion of -3.81 indicats that profits were decreased on the average of $3.81 for each additional dollar added to the per acre value of real estate. The average size of all farms was 174 acrs. Deductions for rent, therefore, were 2.18 percent too high. The rate used in obtaining gross rent deductions was 4.06 percent as determined from estimated cash rental values of individual farms. All that real estate actually contributed to the farm income on these farms in 1921 was 1.88 percent on the investment.

devoted to crops. The results are, as should be expected, largely the converse of those shown in table XVI, but a positive notion of the relationship between the crop area and profits is needed as a preface to the discussion of the inter-relationships between different crops and profits.

Losses decreased consistently as the percentage of the farm in crops increased. Farms with 50 percent or less in crops had average losses of $682. Farms which had an average increase of about 116 percent in the percentage of the area in crops had an average loss of $441, while farms with 71 percent and over had an average loss of $214. The loss on farms with 71 percent and over in crops decreased over 300 percent as compared to those farms having on the average only 40.4 percent of the area in crops.

It must not be concluded, however, that the differences noted in average profits in these tabulations are to be attributed wholly to differences in the percentage of the farm area in crops. The apparent relationship is partly the result of associated influences. For example, the same farms which had a high percentage of the farm in crops also marketed more hogs. Strictly speaking, then, the average profits as tabulated cannot be interpreted to be a measure of the isolated factor, percentage of farm in crops. As a matter of fact, when the net influence on profits of variations in the percentage of the land in crop is measured, only a minor degree of influence existed. In practice, however, increasing the percentage of the farm in crops furnishes the basis for other profitable enterprises and it is significant that groups of farms having a higher percentage of the farms in crops had a higher average profit.

Variation in the percentage of the farm in crops are effected in practice by increasing or decreasing the areas of one or more of the individual crops. Naturally, percentage in crops is a composite influence and has more real meaning when analyzed on the basis of each crop separately.

Corn.—On the average, the corn crop occupied 26.4 percent of the entire area of the farms surveyed. Percentages as low as 10 and as high as about 45 were fairly common, the extremes being 7.5 and 62.4. The more frequent percentages of this crop, as shown by table XVIII, were from 21 to 30. For the most part, corn follows itself in the rotation and it is not uncommon for corn to occupy a field three years in succession.

The corn crop is grown primarily for feed. Four-fifths of all the corn grown is fed on the farm where grown. On the average about 10 percent of the crop is harvested by hogging down and about an equal amount is cut and shocked. Silos were found

TABLE XVIII—RELATION OF PERCENT OF FARM AREA IN CORN TO PROFITS

231 Farms; Year 1921

Percent of farm in corn	Number of farms	Av. percent in corn	Profits
20 and under	48	15.3	$-841
21 to 30	87	25.7	-311
30 to 40	66	34.8	-295
41 and over	30	47.0	-243

on 43 of the 231 farms, but of the 43 only 32 were filled from the 1921 crop. Most of the silos were on the larger farms. On 32 farms the fattening of steers for market could be classed as a major enterprise. On these farms, much of the corn grown on the farm as well as the surplus of several neighbors in many cases was fed to steers. Otherwise, most of the corn fed went to hogs on the majority of farms.

To attempt to answer the question, "What percentage of corn acreage was most profitable under the conditions which prevail in this locality?", the 231 farms are classified in table XVIII into groups based on the percentage of their crop area devoted to corn.

Aside from the fact that farms having less than 20 percent of the area in corn lost heavily, and they were unfortunate primarily because the magnitude of their farm operations as measured by gross income was small, the tabulations show no marked positive relation between percent of farm in corn and profits[12].

Notwithstanding that no positive influence could be attributed to corn as contributing directly to profits, one must bear in mind at least two additional considerations. First, as an average condition farmers lost money on their crop enterprises during 1921. The losses on the average, however, varied for different crops. Secondly, different farmers combined crop enterprises in different proportions and naturally any combination, within certain limits, which substituted an acre of the more profitable crop, from the standpoint of averting losses, for an acre of one of the less profitable was more fortunate in the end. Corn, when measured on this basis, was the most profitable crop[13]. On the whole, then, other things remaining unchanged, farms having displaced pasture or small grains with corn were to be found in the higher profit ranges.

[12]The entire absence of a direct positive relationship is confirmed by the correlation coefficient between the two factors. The coefficient of net correlation between percent of farm in corn and profits is $-.0375 \pm .0443$.

[13] As an average condition an additional acre of corn increased profits to the extent of $1.75 more than an additional acre of small grains and, likewise, was $6.00 per acre more profitable than hay and pasture.

Small grains on these farms consisted almost exclusively, as was shown in the chart in fig. 5, of wheat and oats. There was a strong tendency for the percentage of the farm area in small grains to remain constant as the size of the farm in acres increased (table XIV). Corn acreage increased as the size of the farm increased, but the increase was not in proportion to the increase in the size of the farm.

Practically all the wheat grown was a winter variety. Wheat was grown on 133 farms and only nine reported a spring variety. Wheat was a more profitable crop than oats, but was rarely used to displace oats in the rotation entirely because oats were needed for feed. Wheat, therefore, usually comes into the rotation to displace hay and pasture acreage and large fields are for the most part found only on large farms.

Oats, like corn, are grown almost entirely for feed. There were only a very few farms which did not grow oats at all. Likewise it was unusual to find exceptionally large fields of oats. Most of the fields did not vary much from the average of 20 acres.

Increasing crop acreage by increasing the area in small grains was not so profitable as increasing the corn acreage. In general, the tabulations in table XIX do not show any definite influence on profits resulting from an increase in the percentage of the farm in small grains. The one exception was on those farms having more than 40 percent of the farm in small grains. These 15 farms had a high average percentage in small grains, primarily because they were medium to large farms and seeded more than the average number of acres to wheat without reducing the acreage to oats. The large acreage in wheat also helps to explain the average loss of only $59, which was nearly $300 less than the loss on farms having 10 percent less in small grains. It also happened that the amount of pasture on these farms was below the average for all farms of the same size. Since wheat was a more profitable crop than oats, increasing the proportion of wheat without decreasing the percentage of corn effected the most profitable combination.

TABLE XIX—RELATION OF PERCENT OF FARMS IN SMALL GRAINS TO PROFITS

231 Farms; Year 1921

Percent of farm in small grains	Number of farms	Av. percent in small grains	Profits
10 and under	42	3.6	$-722
11 to20	68	15.9	-332
21 to 30	69	25.0	-402
31 to 40	37	35.7	-337
41 and over	15	46.8	- 59

MOST PROFITABLE COMBINATION OF CROP ENTERPRISES

From the foregoing discussion it appears that the most profitable combination of crop enterprises required that not more than 20 percent of the farm be in pasture. On small farms even less was more desirable.

Corn should have occupied the most important place in the cropping system and it was quite important that the rotation be built around corn so that corn would be grown on at least 30 percent of the farm area each year. Increasing the percentage of the farm area in corn to 40 percent, and on some individual farms to slightly more, tended to increase the profits. The remaining area was usually about equally divided between oats, wheat and hay, except that wheat was not grown on all farms.

A small group of farms which were slightly larger than the average profited by growing more wheat than the average rather than increasing the corn acreage. Only the larger farms found it possible to increase the wheat acreage to that extent because the corn, oats and hay were needed for feed. Increasing the wheat acreage on these larger farms had the advantage of increasing corn acreage in that it gave a better distribution of labor and made it possible for one man to handle more acres of crops.

These farms need a better hay crop. For the most part the hay grown is timothy or timothy and clover mixed. A few farms had good fields of clover and a much smaller number had a small field of alfalfa. Clover or alfalfa should displace timothy as rapidly as the soil can be put into condition to insure a good stand. A better grade of hay is needed for the livestock enterprises and the yield of grain crops could be materially increased by a more liberal use of legumes in the rotation.

UTILIZATION OF CROPS

Once the crops are grown, it is a question of whether to sell them or feed them on the farm, and if they are to be fed, what portion shall be fed to hogs, cattle or dairy cows. Since the importance of an enterprise depends upon the income received from it, the farms have been classified and grouped according to the percentage of income which the enterprises represented. On the average, increasing the number of animal units served to increase farm profits. All types of livestock did not share equally in this positive influence, however. Gross income from poultry contributed more to profits than did an equal amount from hogs, cattle or dairy products. Similarly, hogs exceeded cattle and cattle in turn exceeded dairy products. Feed, labor and equipment were applied on the average, then, more profitably, first to poultry, second to hogs, third to cattle, and last of

all to the production of dairy products. It is significant, however, that during this year it was more profitable to sell the crops than to feed them, unless they were fed to poultry or hogs. Gross income from crops contributed more to profits than did an equal amount from cattle or dairy products[14].

Hogs.—The receipts from hogs constitute 32 percent of the total income of the 231 farms. Only six of the total number reported no income from this source. From the standpoint of the percent of total income, this enterprise, therefore, heads the list as a source of cash income. On the average, these farmers keep from 7 to 10 brood sows. From these sows they raised an average of 40 spring pigs in 1921. More than half, or 143 of the 231 farms, had fall litters farrowed. The fall farrowing averaged 31 pigs per farm on the 143 farms. About half of the brood sows were kept over for another season's farrowing. On this basis each farm markets about 50 young hogs as an average each year. The number varies, of course, but depends quite largely upon the amount of corn available for feed.

An exhibit of the influence upon profits of varying the magnitude of the hog enterprise is shown graphically in fig. 8. Each dot on the chart represents a farm and the location of the dot is determined first, by the percentage of the total income represented by hogs, and second, by the amount of profit realized by the respective farms. Farms with a higher percentage of the total income represented by hogs displayed a definite tendency to find a place in the higher profit ranges. The tendency for the trend of profits to curve slightly downward rather than to continue in a general straight line upward is significant, especially since a similar tendency was noticeable in other groups selected on the basis of the size of the farm in acres as well as in a group including all farms. Most farmers appreciate the generally known fact that even enterprises which are profitable under usual conditions cannot be expanded to unusual degrees without a detrimental influence on profits; yet the demonstration of the principle here in the chart may be taken as an occasion to reemphasize the principle.

Cattle.—The cattle enterprise as conducted on these farms was not a profitable one in 1921. Farms having a large number of cattle were on the average among those farms which suffered heaviest in losses. Relatively, cattle were enjoying better market values during the year than corn, oats or hay; but the cattle

[14]The coefficients of net regression for the various income factors which were obtained by the correlation analysis are interpreted to indicate that for every percent of total income that came from hogs instead of poultry, profits were decreased $0.63; if from crops $3.54; if from cattle $6.75; and if from dairy products $14.48.

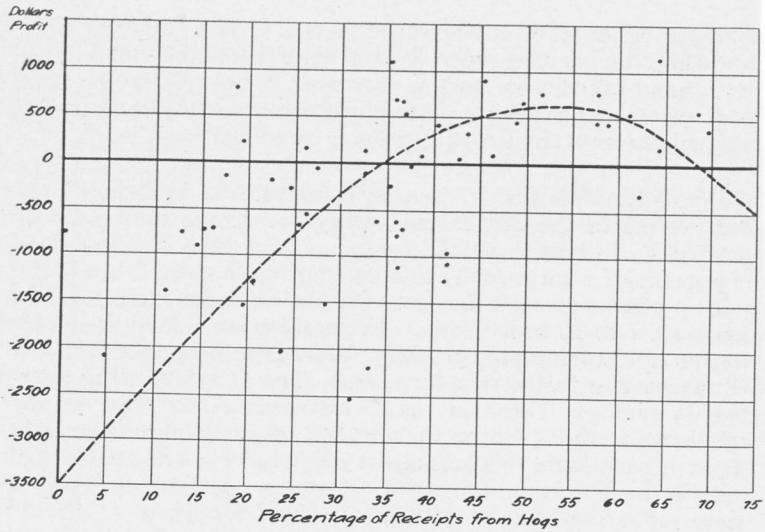

Fig. 8. Relation of percent of farm receipts from hogs to profits. Each dot represents the profits of a farm having the percentage of total farm receipts from hogs indicated by its position on the horizontal scale. The figures were taken for the 59 farms in the 141 to 180 acre size group of the farms surveyed in 1921. Note the trend in profits as shown by a curve fitted free-hand.

market was in a position of decline from the previous year. Feeder cattle were put into the feed lot at higher price levels for cattle than existed when they left the lots. Also, breeding herds represent heavier investments than other classes of livestock and the changes in value downward between inventory dates had a tendency to magnify depreciation on the herd. Further, the cattle enterprise is closely associated with the proportion of the farm in pasture and the productiveness of the pastures. Farms which had approximately 20 percent of the area in pasture and kept a small herd of cows were on the whole more profitable than those having more pasture and more cattle. Even tho cattle had a more nearly normal market, it is doubtful whether the cattle enterprise would have returned a profit for the pasture and other costs prevailing at the time.

The cattle found on these farms would be for the most part classified as beef type. The Shorthorn breed probably predominates, but very few purebred animals were found. Some of the young stock is sold as calves, but most of it is ordinarily grown out and sold either as butcher stock or feeders. The average sized herds are about 16 head.

As previously stated, several farmers having considerable pasture available utilized the pasture by summer feeding steers. Ordinarily, a few farmers in this area with large farms have

found summer feeding profitable when they had the pasture and a surplus of corn to market. Cattle feeding, however, is limited as an enterprise open to all farmers having extra pasture to market because of the limited amount of surplus corn available in the area for that purpose. Steer feeding on the whole was unprofitable during 1921. Only a very few cattle feeders made money during the year, while many had heavy losses. The unfavorable market situation was very depressing to the steer feeding enterprise.

Dairying.—This area is not preeminently a dairy region. The income from dairy products is in the main incidental to the raising of calves for beef purpose. The relation between the cattle enterprises and dairying is always quite flexible and farmers keeping more or less dual purpose cattle can increase their sales of dairy products, within certain limits, without much adjustment of the farm organization. With the value ratio so decidedly in favor of dairy products in 1921, a part of the calves were vealed and different farmers attempted the dairy business in various degrees of specialization. Only 26 farms of the area reported more than 20 percent of their receipts as being derived from the sale of dairy products, however.

Notwithstanding the favorable price relationship of dairy products and the general tendency for farmers to sell more dairy products than had been the custom previously, dairying, as measured by the percentage of total income derived from dairy products, was unprofitable on these farms in 1921. At least farms receiving larger shares of their total income from dairying were on the average less profitable than those receiving lesser amounts. Examination of the accounts of the individual farms which specialized in the sale of dairy products shows that some few found it quite profitable. On the other hand, others suffered heavy losses.

On the whole, milk on these farms was produced by a herd of cows not adapted to dairying. At best, they were low producers and the cost per unit figured in terms of labor, feeds and equipment exceeded the returns largely because these farmers were not in position to produce and deliver on what was in fact a good market. Not only were the cows low producers, but these farmers had to market sour cream thru centralized creameries, or truck market milk into Des Moines. The tucking expense to Des Moines was high.

Sheep.—Fifty-three of these farms had a small flock. The smallest flock was four ewes, while the largest was 50. The average sized flock for the 53 farms was 18 ewes; but when it is considered that 33 farms ranked below the average it is evident

that most of the flocks were small. The numbers are too small to give any significant results in comparison with profits, but it is felt that under the conditions which most of these flocks were maintained on these farms they were profitable in a minor way. Most of the flocks were kept as scavengers of waste feeds.

Ordinarily, cattle are better producers on good grasses growing on land which is not extremely rough. Farm flocks of major size are found in numbers in Iowa only where the topography is extremely rough and the grasses of poor feeding quality.

Crop Sales.—Most farmers have some crops to sell in addition to what are required as feed for the livestock kept. Moreover, some farmers in the area choose the alternative of selling their feed crops rather than feeding them on the farm. As has been previously stated, these farmers sold on the average about one-fifth of the corn and oats produced. Practically all the wheat grown, except that kept out for seed for another crop, was sold. Having some crops to sell above the needs for feed helps to eliminate the risk of possible crop shortage, which would necessitate the purchase of feeds.

On the other hand, of course, there were some farmers, especially cattle feeders and others, feeding unusually large droves of hogs, who found it necessary to buy additional corn. Warren county ordinarily imports some corn each year for feeding purposes.

Attention has already been called to the fact that it was more profitable as an average condition to have sold the crops on these farms in 1921 than to have fed them unless they were fed to poultry or swine.

Summarizing these comments on the disposition of crops, we may conclude that under the prevailing conditions of the year studied, it was apparently more profitable to expand the hog enterprise than any of the other major livestock enterprises, provided the number of hogs was kept within bounds of the available home grown feeds. In general, it was most profitable to receive about 50 percent of the total income from hogs. It was necessary to keep enough cattle to utilize the pasture which could not be used for cropping, but on the whole cattle and pasture were an unprofitable combination. Dairying was not profitable. Steer feeding should, in the main, be confined to farms having considerable amounts of surplus home grown feeds as well as pasture. Steer feeders did well to break even during the year and some cattle feeders lost heavily. With a more normal market situation, the cattle enterprises as a whole would have been more profitable.

Sheep were found on less than one-fourth of the farms and all the flocks were small. They contributed to profits, naturally,

only in a minor way, but were able to feed largely from feeds which might otherwise have been waste. In addition, each farm should have a flock of hens, usually not less than 50, nor more than 150 to 200. The exceptional man, especially if his farm were small, found it profitable, however, to expand this enterprise beyond this maximum of 200.

PRODUCTIVE EFFICIENCY AS RELATED TO PROFITS

The adjustments in the choice and proportion of both crop and livestock enterprises suggested by this study are of secondary importance compared with the possibilities for changes in the conduct of the enterprises that would result in increased efficiency of production. The quality of the business or the adroitness of the operating technique is indicated largely by the yield per acre, the income per animal unit, work units accomplished per individual employed, and number of animal units carried per acre of pasture.

CROP YIELD PER ACRE

Good crop yields cannot be overlooked as an important factor in determining the size of the farm profits. Table XIV shows the average yield per acre and crop index of the principal crops on the 231 farms, by size of farm[15]. The average yield of corn was 48.8 bushels, which was, as shown in fig. 3, about 19 percent above the normal. The season of 1921 was, therefore, very favorable in the corn crop of the community, but as shown in the chart was not an unusual variation. The average yield of oats was only 26.9 and was distinctly low when compared with the normal. The yield of wheat was fair and the hay yield was quite satisfactory.

As shown in table XIII, there appears to be very little relation on these farms between size of farm and crop index (yield per acre), which is important as an indication that low yields are not the result of large scale operations. While table XIII shows very little relation between size of farm and crop index, examination of records of individual farms shows a variation of from

TABLE XX—RELATION OF CROP YIELDS PER ACRE (CROP INDEX) TO PROFITS

231 Farms; Year 1921

Crop index	Number of farms	Average crop index	Profits
80 and under	29	68	$-577
81 to 90	37	85	-600
91 to 100	62	96	-547
101 to 110	47	106	-219
111 to 120	28	114	-221
121 and over	28	135	-175

[15] See footnote 8 on page 31.

44 to 176 when the average crop index of all farms is taken as 100. Table XX shows that within these very wide limits there is a very distinct relation between yield per acre and profits. Farms having a crop index of 80 and less were penalized with an average loss of $577. There was no appreciable decrease in the losses until the average was passed. Farmers having a crop index averaging six percent above the average (100 percent) had losses which were only about one-half those having a crop index below the average. When the crop index increased to 121 or over, the losses, on the average, were only $175. When each of 14 other factors were held constant so as to get the net effect of variations in crop index, the analysis showed that an increase of one point in the crop index brought about a net average increase of $10.64 in profits. While the data at hand do not demonstrate the whole fact, it is believed that as a rule good yields are ordinarily more profitable than extremely high ones, and decidedly more profitable than very small yields.

While it is true that the crop yields are always largely dependent on climate and soil conditions, which are beyond the control of the farmer, nevertheless, variations in crop yields between individual farmers in the same community are largely the result of differences in farm practices. Where there is a handicap because of the natual fertiltiy or topography of the farm, the farmer should insist on having the proper adjustment made in the rental contract or the purchase price of the farm. Too frequently farmers fail to discount low yielding farms sufficiently when purchasing or renting. It is outside the purpose of this bulletin to discuss at length each of the farm practices wherein these farmers have made mistakes in their efforts to produce a high yield. However, good crop yields are the result of many different factors, among which the following are highly important: "The rotation of crops, including the growing of deep-rooted legumes; the careful use of manure; the use of limestone and phosphate where needed; the thoro drainage of all wet land; the use of good seeds of proved high-yielding and good quality strains, and the treatment of such seed for smut or the testing of it for disease; the innoculation of legumes where the soil is not already innoculated; the use of good tillage methods; the planting of seed at the right time, and avoiding or combatting diseases and insects with the most approved methods[16].

INCOME PER UNIT OF LIVESTOCK

The variation in the average crop yield per acre from one farm to another is ordinarily much less than in the average re-

[16]Case, H. M. C., and Mosher M. L., Increasing Farm Earnings by the Use of Simple Farm Accounts. Bulletin 252, Agricultural Experiment Station, University of Illinois.

TABLE XXI—RELATION OF EFFICIENCY IN PRODUCTION OF LIVESTOCK (LIVESTOCK INDEX) TO PROFITS

231 Farms; Year 1921

Livestock index	Number of farms	Average livestock index	Profits
60 and under	34	49	$-1167
61 to 80	43	73	-546
81 to 100	66	91	-332
101 to 120	49	109	-242
121 to 140	21	131	277
141 and over	18	177	110

turns per unit of livestock. The variation on these farms ranged from an average livestock index[17] of 49 on 34 farms, all of which were below 60, to 177 on the 18 farms highest in this respect.

The facts given in table XXI emphasize strongly the significance of income per animal unit as a factor influencing profits. The 34 farms averaging only 49 percent efficient in livestock production had minus profits of $1,167. The increase in profits was consistent and significant as the efficiency in handling livestock increased, except in the case of the last group. For each additional point on the livestock index, the net average increase in profits was $12.75. The turn in the trend with this last group was due to the combination of at least two conditions. First, some of the 18 farms having a very high livestock index were small farms with only a few head of livestock which were given special care, and naturally a high return per unit was realized; yet the total farm income on these farms was low because of limitations in other factors. Then, secondly, others of the group of 18 farms were specialized dairy farms, which had a high gross return per cow, but a lower net farm income than the more general type of farms.

The results of this study show very clearly that the farmers of Warren county can increase their profits more markedly and more certainly by giving increased attention to grades of livestock, feeding rations, sanitation to prevent diseases, and particularly by reducing pasture feed costs. The marketing of live-

[17]The average receipts per animal unit from each kind of productive livestock were calculated for all the farms of the area. The average receipts per unit of colts were $53; for cattle $40; for hogs $88; for sheep $51, and for poultry $151. The average receipts per animal unit fo reach class of livestock were rated as 100 percent. The animal index is then calculated as follows:
(1) Divide the receipts from each class of livestock on each farm by the number of animal units of that class kept.
(2) Divide the receipts per animal unit for each class of livestock by the average receipts per animal unit from that class of livestock in the whole area, to get an index of the efficiency of produciton for each class of livestock separately.
(3) Weight the separate indices by multiplying the index of each class of livestock by the number of animal units of that class of livestock on the farm and divide the sum of weighted indices by the total number of animal units. The results is the livestock index.

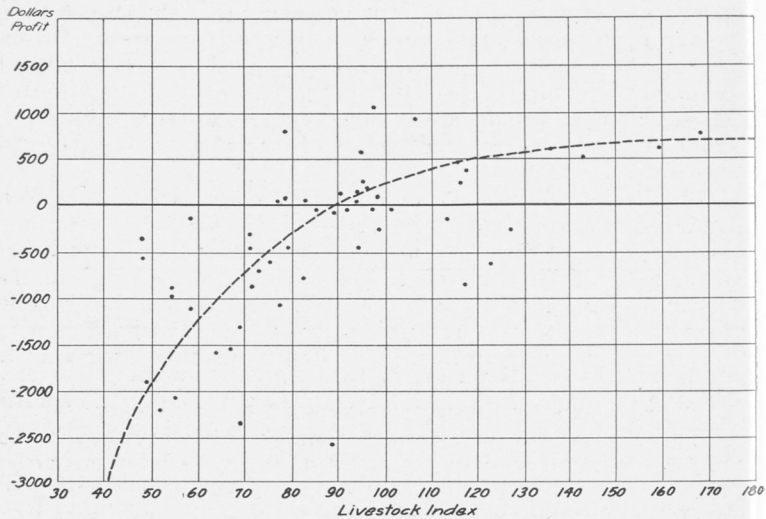

Fig. 9 Relation of efficiency in livestock production (Livestock Index) to profits. Each dot represents the profits of a farm having a livestock-index indicated by its position on the horizontal scale. The figures were taken for the 59 farms in the 141 to 180 acre size group of the farms surveyed in 1921. Note the trend in profits as shown by a curve fitted free-hand.

stock and livestock products at seasons of most favorable price is quite important in this connection.

The degree and consistency with which the profits increase as the livestock index increases, is shown in fig. 9. Here we have shown by means of the "scatter diagram" the position of each farm of the 141 to 180 acre size group as determined by reference to its numerical values of profits and livestock index.

CROP ACRES WORKED PER MAN

The more successful farmers usually work more crop acres per man without reducing the yields and at the same time care for more units of livestock per man than less successful farmers. Table XXII shows the effect on profits of increasing the number of crop acres that each man employed cared for.

The number of work units accomplished per man is partly a problem of organization. In order that one man may handle a

TABLE XXII—RELATION OF CROP ACRES WORKED PER MAN TO PROFITS

231 Farms; Year 1921

Crop acres worked per man	Number of farms	Average crop area	Profits
60 and under	85	72	$-571
61 to 100	112	111	-349
101 and over	34	154	-186

large number of crop acres, it is necessary that the crop rotation be arranged to distribute the labor on the crops evenly thruout the growing season. Likewise, the livestock program must be planned to require evenly distributed and continuous attention. To supplement organization, however, the workers must be industrious and have the ability to withstand hard labor day after day.

The use of additional amounts of labor by some farms to accomplish the same results in the way of number of crop acres and amounts of livestock handled per man as accomplished on farms more thrifty in the use of labor units operated to their distinct advantage. In fact, the efficient use of man labor ranked next to a high income per unit of productive livestock as a factor in determining profits. For every month's labor that the farmer was able to dispense with, without changing any of his enterprises, his profits were increased on the average $67.50.

The efficient use of man labor may be accomplished by having the farm large enough to permit using available labor to its fullest capacity, adoption of a crop rotation which will give a uniform distribution of man labor thruout the crop season, the combining of livestock and crop production so as to utilize labor more evenly thruout the year, and planning ahead to utilize rainy days and slack periods with jobs which do not have a seasonal character.

PASTURE YIELD AND UTILIZATION

Still another measure of efficiency in the management of the farm is the amount of pasture necessary to carry an animal unit. Of the farms included in the survey, 53 were able to carry an animal unit on less than one acre of pasture. These 53 farms had an average loss of only $206. Those farms using about the usual amount, one to two acres, were only slightly less profitable. On farms requiring more than two acres the increase in losses was very significant. The 19 farmers pasturing each animal unit on more than three acres had a minus profit of $1,135. For each additional acre used in carrying an animal unit, the average decrease in profits was $233.

The carrying capacity of the pasture on some of these farms is naturally low. Some pastures are topographically unsuited

TABLE XXIII—RELATION OF NUMBER OF ACRES OF PASTURE PER ANIMAL UNIT TO PROFITS
231 Farms; Year 1921

Acres of pasture per animal unit	Number of farms	Av. no. acres pasture per A. U.	Percent of farm in pasture	Profits
1 and under	53	.7	21	$-206
1 1 to 2	111	1.5	32	-277
2.1 to 3	48	2.5	41	-630
3 and over	19	4.0	49	-1135

to the production of heavy feeding grasses. Others are wooded, some are marshy, and in many instances the pastures are located on the poorest soil of the farm. Emphasis has already been placed upon the fact that there has not been enough discrimination between farms having various amounts of pasture and pasture of varying degrees of income yielding power. Recognition of these differences in terms of rent or investments offer the surest way to profit. For immediate results, however, much can be done to improve the physical condition of many otherwise poor pastures. Many of the pastures need to have brush cleared off and a general renovation and reseeding to increase the carrying capacity. Allowing the stock on the pasture early in the spring before the grass has a good start is a common practice which reduces the amount of feed obtainable from the pasture during the season. Using the pastures for exercising grounds for the stock during the winter months also tends to kill out the grass, and judging from the relation between the percent of the farm in pasture and the number of animal units per acre, some of the farms with a high percentage of the farm in pasture were not utilizing their pasture to its fullest capacity.

GENERAL CONCLUSIONS—WITH SUGGESTIONS

Considering the results of this study as a whole, some conclusions on the causes of low returns for the less profitable farms are given. The following brief discussion deals with how the individual farmer may recognize these causes of low returns and to what extent he can direct his own efforts and the aids available to him to remedy such difficulties in his farm business.

The analysis of the organization and management methods of these 231 farms, which range thru a wide degree of financial success as graphically shown in fig. 8 on page 27, has demonstrated very decidedly that under conditions existing in Warren county at the time the survey was taken, there were a number of factors which were significant in causing variation in the degree of financial success. While all these different factors merit the significance associated with them, there are a few factors which have outstanding importance. These outstanding factors represent the weakest points in the organization and those where lack of uniformity in the farm organization and farm practice had the greatest influence on profits. These factors, in order of importance, are: (1) The production per animal; (2) The efficiency in the use of man labor (months of man labor employed); (3) Value of the real estate per acre—because it influenced the deduction made for the use of land; (4) Crop yields, and (5) The amount of pasture used to carry one animal unit[18].

[18] These five factors were found to be the ranking factors when the net relations of each of the 14 factors to profits were computed.

The first one of these causes in deficient profits, namely, the over-evaluation of real estate, either in the form of too high a purchase price or assumed capital value or in the form of too high cash rent, is primarily a matter of business judgment. In the case of the man who has bought land at too high a figure, the mistake was doubtless made by failing to analyze the situation from the point of view of limiting investment to an amount on which the land might promise a fair rate of return. Too many buyers of land for farm purposes fail to apply this very important test. They assume a burden of investment on which the land is not capable, even with fairly careful farming, to pay an adequate return. In the case of rental, it is important that he study well the productive possibilities of any farm which he proposes to rent and base his offer of rent, either in cash or share of the product, on a conservative estimate of how much the farm will produce over and above his operating expenses.

A second point, that of labor utilization, is purely a matter of planning and management. It is possible so to arrange the labor program of the farm year as to avoid a considerable portion of idle time. This is done by looking ahead and taking care of the minor tasks during periods of little demand for labor and leaving clear of such work the seasons when crops and other enterprises make maximum demands for labor and the tasks connected with them are such as cannot be delayed without serious loss. The figures in this survey, as in practically all others, show a very wide degree of difference in the matter of how thoroly the available labor is utilized. When, as the figures show for the year 1921, there is a reduction in profits of $67.50 for every additional month of man labor employed, it behooves the farmer to cut his labor use to a minimum. This may mean that on some farms less labor will be hired, and that on other farms some of the available help, as that of grown sons, will be released for work on the farms of neighbors or for other occupations. On most farms, however, it will mean reform in planning work and managing the labor so that more productive hours and days of labor will be obtained from the laborers on the farm. And it may also mean the speeding-up of the rate of accomplishing farm tasks.

The remaining three of these important influences on profits are matters of technique or farm practice. They have to do with the maintenance of soil fertility, the proper breeding and care of livestock, and proper crop and pasture practice. In the case of practically all of these influences there is much diversity as between farms. Much of the poor showing due to the influence of these factors may be avoided by careful planning and management upon the part of the farmer himself. He may likewise get a large amount of valuable aids in this connection if he

seeks it at the right sources. A great deal of experimental work and study has been carried on by the state Agricultural Experiment Station and the results of a large part of this work are already available in the form of bulletins or circulars.

Taking up first the matter of low livestock returns as a cause of deficient profits, we need to refer briefly to the nature of livestock enterprises in this region. With a large amount of permanent pasture and a limited amount of concentrated feeds it is to be expected that the major emphasis, so far as livestock is concerned, will be put upon hogs rather than cattle. That is, the available rough feed will be utilized very largely in the production of a limited number of beef cattle, the most of which will be sold as stockers and feeders rather than fattened upon the farm. With the limited amount of corn, due to the small amount of crop acreage, very little commercial cattle feeding is practiced. In view of the nature of the livestock industry on these farms, a number of technical points stand out as of special importance in the securing of maximum returns. In the first place, the farmer needs to be an expert breeder and feeder of hogs. He should be able to judge in the selection of brood sows as to the profitable type, and should have adequate knowledge of the most effective and economical rations. On the cattle side of the livestock industry, the important problem seems to be that of making more profitable the general type of cattle enterprise, which means the utilization of the available pasture and rough feeds in the production of as large a number of good quality stocker and feeder cattle as possible. This in turn becomes partly a matter of breeding and selection and partly a matter of proper feeding and care. It connects itself also very closely with another technical point to be taken up later, namely, that of getting maximum pasture yields. On practically all of the foregoing points the Animal Husbandry Section of the Iowa Agricultural Experiment Station has done much in the way of experimentation and study. For such farmers, therefore, as wish to improve their livestock practice to securing greater profits, special attention is called to the following publications: Station Bulletins 110, 136, 182, 185, 188, 195 and 215; Experiment Station Circulars 26, 70, 81, 83 and 91, and Extension Service Bulletins 107, 117 and 126.

The next technical problem to be considered is that of soil management or the maintenance of crop yields under the particular class of soil conditions of this area. Since a very large portion of the farm area is in permanent pasture, the land available for crop production is somewhat limited and the temptation to adopt a rotation in which inadequate provision is made for legumes as soil building crops, is great. With a large amount of permanent pasture, it is unnecessary to provide a place in the

regular rotation for pasture. There is also a considerable amount of permanent hay meadow so that the inclusion of legumes in the regular rotation in order to secure a hay crop has not seemed so important. A further reason for this scarcity of legumes is found in the condition of the soil, which, over a large part of this area, is acid and hence offers an added impediment to the general production of leguminous crops. The livestock kept on the farms provides a limited amount of manure, which may be used to aid in keeping up crop yields, but on most farms this seems to be insufficient and the problem of maintaining crop yields is a serious one.

In view of the peculiarities of the area as just outlined, the need of soil building crops which can be raised in connection with one of the regular grain crops without sacrificing a year's use of land in grain production is one of a great deal of importance. The Farm Crops and Soils Section of the Station has been experimenting in this direction for some time and has met with considerable success in the use of such crops as biennial and annual sweet clover and other quick and heavy growing legumes, to be sown with oats or winter wheat and plowed under late in the same season. Some of these quick growing green manure crops are very sensitive to acid soil, and hence, are not practical under the conditions outlined, unless combined with lime treatment. In many cases the application of lime would be an investment well worth making. Iowa Station Bulletins 150, 213 and 221, as well as Station Circulars 7 and 82 and Extension Service Bulletin 118, all bear upon the important problem of soil management and the maintenance of soil fertility. These publications contain many valuable lessons for the farmers of this area. As already pointed out, many of these pastures are so hilly as to make it impracticable to use the land in the regular rotation. It is always the tendency on such land for the better pasture vegetation to run out and be replaced with plants of low pasture value. There is also a tendency for the pasture grasses to become less vigorous in growth as the pasture grows old and for it to yield less and less in the way of feed for livestock. Here again the Farm Crops and Soils Section has been carrying on some valuable work. The treatment of permanent pasture by discing, reseeding and the use of manure and fertilizer has proved to be a means of greatly increasing the carrying capacity of permanent pastures and seems to be practical on the average farm. A preliminary report of this work has been published as Circular 89 of the Experiment Station. Circular 39 also contains valuable information concerning the seeding of pasture and hay land.

SUMMARY

1. Good organization and management are essential to success in farming. This study was undertaken to determine the important elements in good farm organization and management, particularly as found in southern Iowa.

2. The figure used as "profits" is the remainder from gross farm income after cash expenses, depreciation, rent of land, interest on investment in livestock and machinery, and wages for the labor of the farmer and his family have been deducted. Because of the extremely unfavorable price conditions obtaining in 1921, this "profits" figure was a minus quantity for most of these farms.

3. In 1921 the various crops together occupied 59 percent of the farm land and pasture 37 percent. Of the land in crops, 45 percent was in corn, about 30 percent in small grain, and the balance in hay. Hogs were the most important class of livestock. The large amount of permanent pasture made necessary by the hilly surface helps limit the amount of concentrated feeds available for livestock and causes most of the corn to be fed to hogs.

4. Less than 20 percent of the gross income from these farms in 1921 came from crops, tho practically 25 percent came from this source in 1918 and 1915 when crop prices were more favorable relatively to livestock prices than in 1921. About one-third of the total income came from hogs in 1921. There was less from the sale of cattle and more from dairy products that year than in 1918 and 1915. The adjustment in sources of income was in the main due to relative changes in prices.

5. The three outstanding items in cash expenditures of 1921 were taxes, purchased feed and hired labor. These three constituted 17, 14 and 12 percent, respectively, of the total chargeable expense, which included, besides the cash outlay, depreciation on buildings, livestock and machinery.

6. Notwithstanding the unfavorable conditions existing in 1921, some farmers made profits. There was a difference of $3,261 in the average financial returns made by the 25 farmers doing best and the average of the 25 having the poorest showing out of the 231 farms studied.

7. The study shows that the important influences on the size of the profits or losses were (1) size of business, (2) combination and proportionment of the farm enterprises, (3) efficiency in physical production, and (4) ability in buying and selling.

8. The large farm offers many means of economizing, such as more efficient use of labor, power and machinery; but the effect of these savings was counteracted in 1921, partly by the adverse price relations and partly by the fact that on the larger farms there was a higher percentage of the farm in pasture, which yielded much less income than crop land, but which was valued too high, relatively to its productivity, thus reducing farm profits. Likewise, on the larger farms there was a higher percentage of the crop land in small grain, which was relatively less profitable than corn.

9. Poor pastures and a high proportion of the farm in pasture were outstanding sources of loss on these farms.

10. Corn occupied about one-fourth of the land on the farms studied. On the more prosperous farms this percentage was from 30 to 40.

11. The most profitable cropping system for this area is one with as little pasture as the soil and surface conditions of the farm permit and as much corn as can be raised without reducing yields. Wheat is the most profitable small grain crop.

12. With the exception of wheat, nearly all of the crops grown are fed to livestock. Since corn production is limited by the condition of the land, and as hogs seem, on the whole, to return more value from feeding than beef cattle, most of the corn crop is utilized as hog feed and the fattening of cattle is exceptional. Pasture and roughage are used in the production of stocker and feeder cattle. There is some cattle feeding on the better farms. Many of the farmers combine a limited amount of dairy production with the general cattle enterprise.